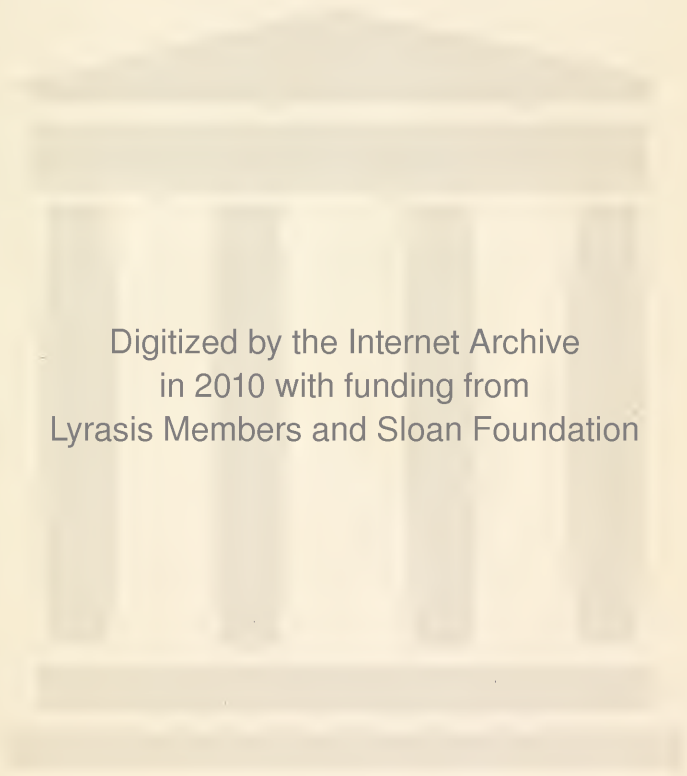


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THE JOY OF IGNORANCE

For in much wisdom is much grief; and
he that increaseth knowledge increaseth
sorrow.

Ecclesiastes 1:18

Our nimble souls
Can spin an insubstantial universe
Suiting our mood, and call it possible,
Sooner than see one grain with eye exact,
And give strict record of it.

—GEORGE ELIOT—*The Spanish Gypsy*

(Used by George Henry Lewis in his *Physical
Basis of Mind* on the title page to "Problem
II, The Nervous Mechanism.")

THE JOY OF IGNORANCE

BY
T. SWANN HARDING



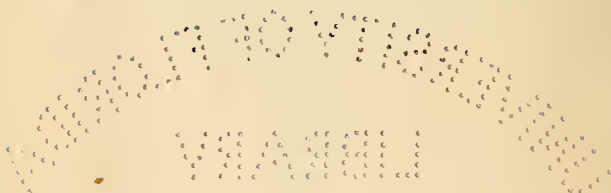
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*To my Mother
Who always told me
"Don't start anything you can't finish."*

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PRELIMINARIES

CHAPTER I

STRANGE WINDOWS UNBARRED

SOME years ago it was my custom to attend a sort of weekly convocation of cranks called an open forum. Using the word ignorance in the sense of "want of knowledge in general, or in relation to a particular subject," I think I can say this was about the most ignorant group of people I ever saw gathered under one roof. But they were very happy. Of course they snarled and snapped at each other occasionally but I think not in rage; they rather did this as do happy dogs at play. Some of these people actually approached genius in their phenomenal ability to be so totally misinformed about so many things at one and the same time, but theirs was a joyful ignorance, for does not Logan Pearsall Smith say in his *Afterthoughts*, "It is through the cracks in our brain that happiness creeps in?"

There was always a speaker of the day at this forum. The speaker frequently specialized in misinformation on one certain subject. Occasionally he was quite impartially misinformed on all subjects. On very rare occasions he knew what he was talking about and offered the group genuine knowledge instead of sciolism, or systematized ignorance. The attributes of the speaker really made

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little difference for the members of the group paid no slightest attention to what he said anyway. They were each and every one happy in their own particular brand of ignorance and awaited with visible impatience their weekly opportunity to stand up and impart it to others.

Consequently, as soon as the speaker finished, and regardless of what he talked about, one gentleman would arise and sternly remark that he threw his glasses away fifteen years ago and had seen perfectly ever since. He had gone to some remarkable New York wizard who gave calisthenics to the eyes. On the first night the class met in Battery Park and threw their glasses overboard with appropriate ceremonies and considerable jubilation. Later it is rumored several of them returned and dived after their glasses for days, but they were weaklings. The speaker took the exercises for one week, he saw perfectly, his mind cleared, his general health improved, and every wearer of glasses should do as he did. He then sat down with a satisfied smile.

Immediately thereafter a lady arose. She communed easily with the disembodied spirits of the departed. Some years ago she had attained press notoriety by writing a woman friend a letter of condolence on the death of her husband. The wife remonstrated because her husband was alive and well. The seer replied dourly that might be but the letter of condolence was not misplaced as he would surely die soon. The husband was singularly inconsiderate and had lived for years, even gaining in weight. That, however, did not disconcert the lady who com-

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muned with disembodied spirits and who now told of the delight with which she frequently ate Sunday dinner with her long deceased great-grandmother, and also of having seen a 180-pound man turned into eight gallons of water, with a little grayish sediment at the bottom, which undoubtedly constituted his soul. She spoke darkly of molecular vibrations and radiant oscillations and in her turn sat down with a happy smile.

The third speaker was usually a man who claimed to be ninety. He was an authority on errors regarding physiology and diet. On these subjects his nescience was simply astounding. He usually explained how the blood travelled through the veins at a high rate of speed; the friction between the blood and the vein and arterial walls naturally generated magnetism because, as we all knew, there was iron in the blood. To retain that iron there we must be vegetarians. In fact meat not only denied us iron but tended to infuriate our dispositions, to make us violent and impassioned. Indeed meat eating bred war. Forty years ago the speaker, then on the brink of an early grave, had changed to a vegetarian diet and studied the magnetism of the blood only to effect his physical regeneration and live to ninety. As a fillip to the first speaker he always remarked that he had not exercised his eyes but he did not wear glasses.

Thereafter some twenty-five or thirty experts on what is not true would eagerly proclaim their joyful ignorance. They seldom sought to convict others of iniquity in a really passionate manner because they were too happy to

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do that. Finally, Pastor Green would mount the platform. He would offer to defend the Ten Commandments against all comers and would explain how the saving grace of Jesus removed him from the gutter and made him what he was today. We always laughed then because Pastor Green was a most unkempt and unprepossessing spectacle, and some unidentified voice always remarked gutturally: "There's nothing to thank Jesus for in that."

Pastor Green's misinformation was lavish in quantity and of impressive variety. He knew the last word on pruning trees and he was an authority on curing stone; he could not only remove warts, he knew what caused cancer and had cured one of his own with a salve he made himself. So enthusiastic was he about his own brands of ignorance that he could laugh loudly at ours and we, his hearers, each confident in our ignorance, laughed just as loudly back at him and at his. Ultimately Pastor Green would explain that the world was a flat parallelogram, that its center was the ocean, and that the sky was glued to high walls on the edges. He would remark that it was heretical to believe in the existence of the Antipodes, this being against "the law and the testimony." For St. Paul said that all men were made to live upon "the face of the earth"; hence men could not live upon more faces than one, nor upon the back of the earth. Indeed, he held, the shape of the universe is made quite evident from the shape of the tabernacle of Moses because St. Paul refers to the earth as a tabernacle.

Here Pastor Green had come upon an ancient error of

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respectable lineage. You will find it expressed exactly that way by Cosmas who lived in 535 A.D. and wrote his *Christian Opinion Concerning the World*. In those times Sylvester Giraldus was writing in his *Relations Concerning Ireland* that the birds called barnacles found on this island came into being in a remarkable manner. First gummy excrescences exuded from pine beams and floated upon the water. These enclosed themselves in shells, later birds formed in them, hung by their beaks, became covered with feathers, released themselves—and there you were, the result being something like marsh geese, only smaller. In 1676 Sir Robert Murray was reporting to the Royal Society of England on the manner in which birds arose botanically from vegetable sources, while Albertus Magnus held that certain birds sprang directly from trees and were nourished by the sap.

Well, I used to sit in at this forum and laugh in my own way. For I also specialized in a certain form of human ignorance called science, and I was arrogant in my knowledge and inclined to deprecate theirs. I was afflicted with what I thought to be intelligence, the doubts whereof are always conditioned by its habitual beliefs. Intelligence is chockfull of prejudice, as Vernon Lee has remarked, and as all are aware who ever asked it to accept miracles and ghosts on their testimony, or on the authority of someone else. "Such people exclaim at the skeptic's blindness to evidence, because they do not know that doubting and even denying are part of Intelligence's active rhythm of grasping and acquiescing; a process of assimilation and

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elimination in which the already experienced and accepted selects that which shall be accepted or rejected."

Yet in becoming a skeptic I gradually came to the point where, like my recently dead friend, Jesse Lee Bennett, I found that I believed everything. I became somewhat like the character in Cabell's *Cream of the Jest* who remarked "I quite fixedly believe the Wardens of Earth sometimes unbar strange windows, that face on other worlds than ours. And some of us, I think, once in a while get a peep through these windows. But we are not permitted to get a long peep, or an unobstructed peep, nor, very certainly, are we permitted to see all there is—out yonder. The fatal fault, sir, of your theorizing is that it is too complete. It aims to throw light upon the universe, and therefore is self-evidently moonshine. The Wardens of Earth do not desire that we should understand the universe, Mr. Kennaston; it is part of Their appointed task to insure that we never do; and because of Their efficiency every notion that any man, dead, living, or unborn, might form as to the universe will necessarily prove wrong. So, if for no other reason, I must decline to think of you and me as characters in a romance."

Only a few weeks ago I sat in the Tabernacle of The Latter Day Saints at Salt Lake City and there an apparently hard-boiled Englishman opened one of the windows for me through which I had never seen before. He informed me that Jesus Christ had lived and worked among the Indians on the North American continent for a number of years, performing miracles every bit as wonderful

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as those he had performed in the East. He declared that except for the Crucifixion, upon which the East had a monopoly, the work of "the Master" here was every bit as wonderful as his work in Palestine. He then went on to trace the downfall of civilization on this continent, caused by a falling away from "the Master's" teachings, and wound up by explaining the "work" then being performed in the Temple nearby where marriages for the life in the future were solemnized, and where the pious of today were enabled to save the souls of their wayward ancestors.

The man told this with perfect sangfroid. He had a happy smile on his face. No doubts animated him. There could indeed be no doubt whatever about the matter. It was the positive truth. We Gentiles who heard him also had smiles on our faces, smiles that we could not obliterate. For our own joyful ignorance told us that he did not know what he was talking about. We had gone to Sunday school for years and we knew jolly well Jesus had not been in North America or we should have been told about it. But we were too polite to criticize him. We humored him instead. Indeed he spoke with such positive assurance that I actually found myself believing him, while he had the window open. But immediately he closed it I became doubtful.

A week later I told this experience to an old gentleman in Colorado who was going home with a quart bottle of Listerine under his arm. I also said casually, "You should get great satisfaction from the use of that stuff

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which the American Medical Association reports is a solution of well known substances that has little bacteriologic merit and, as normally diluted with saliva in the mouth, has no bacteriologic action whatever." The old gentleman stopped short in his tracks, looked at me severely and said, "Will you tell me what I can believe after you damned scientists have your say? I've used Listerine for years. I like it. I was happy to use it and I want to stay happy. It makes my mouth taste nice and I'll keep on using it!" I could only reply, "I, sir, I am a skeptic. I believe everything," and I insisted I believed that story about Jesus which angered him no end because he said he had no faith whatever in such myths.

Somewhat later I shall speak further of Listerine and with more show of authority. Just now let us consider a little man's almost inevitable gravitation towards belief in the absence of factual evidence. Or suppose I say "sensual" evidence. To illustrate what I mean here is Galileo writing of the Copernican system and saying, "I cannot sufficiently admire the eminence of those men's wits, that have received and held it to be true, when the sprightliness of their judgments offered such violence to their own senses, as that they have been able to prefer that which their reason dictated to them, to that which sensible experiments represented most manifestly to the contrary." This is plain enough. Galileo praised men, did he not, for having faith in things which contradicted sensual evidence? Could he not have believed then in the bactericidal efficacy of Listerine? Perhaps.

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However, Galileo was not always consistent in his allegiance. Writing to Kepler he once decried pure reason just as strongly as he had, in the sentence above, recommended it. For he said, "Oh, my dear Kepler, how I wish that we could have one hearty laugh together! Here at Padua is the principal professor of philosophy, whom I have repeatedly and urgently requested to look at the moon and planets through my glass, which he pertinaciously refuses to do. Why are you not here? What shouts of laughter we should have at this glorious folly! And to hear the professor of philosophy at Pisa laboring before the Grand Duke with logical arguments, as if with magical incantations, to charm the new planets out of the sky!" What shall we say? How can I avoid skepticism when a man whose name is always spoken reverently by rationalists advises me both to believe my senses, and to believe my mind regardless of sensual evidence?

Nor were such men as Kepler immune to what we should call the most astounding sort of quack metaphysical notions. For Kepler was himself convinced that a sufficiently profound study of the astronomical system would reveal the mathematical harmonies upon which it is based. He also held the moon to be a perfect sphere, hence devoid of mountains, because it was a heavenly body. When he found that the "five regular solids" could be inserted between the spheres of the six planets known to him, he presumed that he had discovered why there were and could only be six planets. He believed most exceedingly in the mystical power of mathematics. On

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the other hand, many years after Kepler died, Kelvin objected that he could not understand anything of which he could not make a model.

Galileo had, by his handiwork, made God—as Aristotle conceived him—quite dispensable; but to deny him outright was far even from Galileo's mind. He therefore did not hesitate to invert Aristotelian metaphysics and to regard God as the First Efficient Cause, or Creator of Atoms. This doctrine was already wandering vaguely around in various sequestered corners of Europe, and was almost certainly the invention of some Arab speculators who desired to reconcile atomism with Mohammedan theism, in itself a suggestive thought. The idea also fitted admirably into the popular Christian picture of God originally creating the world out of nothing. "God thus ceases to be the Supreme Good in any important sense; he is a huge mechanical inventor, whose power is appealed to merely to account for the first appearance of the atoms, the tendency becoming more and more irresistible as time goes on to lodge all further causality for whatever effects in the atoms themselves."

Do not imagine in spite of all this, however, that Galileo hesitated to explain the spots on the sun as black smoke produced by the ethereal foods which the sun was assumed constantly to devour in order to radiate light and heat for our human pleasure. Nor did Galileo fail to account for Joshua's potency in commanding the sun to stand still by supposing, as did Kepler, that the planetary revolutions on their axes were caused by the revolution of the sun's

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upon his—hence a temporary cessation of the latter obviously explained the stoppage of the former! When ultimately Newton arrived upon the scene, God was retained, but the mathematical potentialities of the celestial intellect were realized more strikingly than at any previous time in the history of the universe.

Newton himself regarded the prevailing theory of *actio in distans* as absurd for metaphysical reasons. For methodological reasons he ignored the physical causes of gravitation, though he believed they existed. He protested against those who regarded gravitation as a fundamental force of matter. Huyghens, Leibnitz, and Johan Bernouilli were all deeply offended by the idea of separating mathematics and physics. These were sensual prejudices of the same sort that opposed the work of Copernicus. So today it is the difficulty inherent in making a physical concept which contradicts a picturable physical principle that impels our older physicists to write frantic articles denouncing Einstein and his theories.

Again, Newton's work never disturbed his faith in God. Medieval philosophy, seeking to solve the ultimate "why" of events, instead of their immediate "how," of course needed the concept of God as an ultimate cause. Newton did not need God for that purpose, but he retained him, converting him into a sort of cosmic plumber and engineer, his eye "constantly roaming the universe on the search for leaks to mend, or gears to replace in the mighty machinery." All of which merely demonstrates that a man, no matter how scientific and rational in certain

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aspects, will almost inevitably share the ideas of his age upon ultimate questions he has not fully investigated, and is constantly tempted to make a metaphysics out of his own method—i.e. to suppose that the universe is of such a sort that his attitude toward it, and his method of examining and appraising it, are of necessity appropriate and successful. It seems unnecessary to adduce Pasteur's religious faith, Ingersoll's pathetic devotion to the wisdom of the Republican party, and Darwin's inability to doubt the accuracy of a scale or a measuring glass, not to mention his habit of taking scrupulous pains in making measurements on rough scales.

It is very fatuous to assume for a moment in this so-called scientific age that we have gotten very far away from belief founded crudely upon sensual impressions, in order to believe only when sensual impressions have been refined and polished by rational processes. It is fatuous to assume that we live in a rational or in a scientific age. Scientific beliefs are essentially dynamic. They are the temporary resultant of violent factual forces, pushing in all directions, with the mind above the battle, objectively reasoning and seeking by logical principles to comprehend. Nonscientific beliefs tend to become static. Originally the resultant of certain forces then operating powerfully, they suddenly stop dead in their tracks, refuse to move further, and altogether resist the blandishments of reason. Finally, it is somewhat more joyful to be ignorant than to be well-informed simply because nonrational processes are

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imbedded more deeply in our natures than rational processes.

Hence arise various consequences. An interesting example may be found in this paragraph from Douglas Woodruff's *Plato's American Republic*.

"So did I excuse him," I answered, "for I knew that that man was intoxicated, not indeed by wine, but by statistics, for the Americans find in statistics a drug more powerful than alcohol, the women shamelessly revealing their craving and attending lectures, and crying out for facts, but meaning these numbers. For all large numbers and all numbers arranged in patterns have a magical power over them. And they will eagerly deny their own personal experience if it seems to upset what the statistics say. . . . Pitable indeed, but they wear these chains of numbers proudly, for in general the numbers are large. And they have no notion that these numbers must be used with care, but will let themselves be led into any error by any cunning piper luring them to destruction, provided only he can pipe the proper magic ciphers and talk to them of percentages. For these statisticians have more power to make great crowds follow them than ever Orpheus had."

In this instance numbers and mathematical terms have become useless fictions, and a caricature of science results. True science uses only deliberate fictions which are evolved for very specific purposes and in order to enable it to measure the universe about us. Science thus may assume that light moves *as if* it were propagated by an ether having certain properties which are themselves invented to "explain" the propagation of light by ether. Again, science may assume that matter combines *as if*

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there occurred a union of definite proportions. Both these fictions may be useful, but they are very different in character, because experiment has never been able to demonstrate the truth of the former while it has given very substantial evidence for the truth of the latter.

Various ethers were used speculatively by scientists. Ethers were invented for the planets to swim in, to constitute electric atmospheres and magnetic effluvia, to convey sensations from one part of our bodies to another; space was filled three or four times over with the fictioned ethers invented by scientists. These ethers finally became horrors and frightened science away from the path of progress. Exact demonstrations of their existence remained lacking. Today only one ether has survived—the one Huyghens devised to explain the propagation of light—and recently its existence has strongly been denied. Therefore, especially since the work of Einstein who said, “If you can not demonstrate the existence of ether why bother about believing in it at all?” a substance that was long supposed to be a verifiable reality is now regarded as a pure *as if* fiction, because the facts refused to support it.

In this sense facts dominate scientific theory. In the past more and more facts have supported the fiction that matter combined *as if* a union took place in definite proportions. This idea has ceased to be a fiction and is a firmly established scientific belief today. In return for the assistance rendered by facts, theories organize facts and give them relative explanations. Thus Thales of Miletus knew that amber would attract small bodies to

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itself after being rubbed, and the mineral lodestone was known by Lucretius to attract iron, but only modern theories of electrodynamics have been able to organize these errant facts into useful scientific systems. However, even accepted and verified scientific hypotheses retain much of their *as if* character. Science is also independent of opinions about the possible reality behind all phenomena. Its special results throw no light whatever upon the nature of this reality. One may join to science certain appropriate philosophic principles and propositions and from the twain evolve conclusions of wide ethical, moral, metaphysical, or even religious range—but science can and will never put a categorical positive or negative seal upon such extraneous transcendental conclusions.

I am now about ready to redeem my promise and return to Listerine, by way of quackery. During the 18th century British quacks were able to charge, and be paid, as much as \$2,500 for a pretended gout cure. In 1719 Defoe wrote "The quacks contribute more towards keeping us poor than all our national debts, and . . . to suppress the former would be an infallible means of reducing the latter." In this century also the British Parliament appropriated a large sum to purchase the formula of a secret nostrum to dissolve urinary stone. Joanna Stephens won the prize and gave a recipe for preparing a powder from snails, carrot seed, burdocks and haw; this was to be burned black, mixed with soap and honey and taken internally.

Berkeley's tar water, it should be remembered, cured

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halitosis, weak voice, withered limbs, hemorrhoids, hydrophobia, scurvy, concussion of the brain, gout, yellow fever, and deafness and "would mitigate and even prevent small pox and erysipelas." Nothing was so useful in painful ulcers of the bowels, coughs, consumptions, ulcers of the lung, asthma, dropsy, all kinds of sores, and indigestion. Had Berkeley but mastered the psychological appeal of modern advertising I think I could even have believed all this.

Robert Boyle, great scientist that he was, believed in the therapeutic efficacy of some most formidably repulsive remedies. Sir Thomas Browne declared his faith in palmistry, tutelary angels, the philosopher's stone, and the reality of witches. Even modern scientists tend to become credulous—for instance, to grow tissue under the microscope and then to remark that they have solved the problem of life. If scientists so delude themselves, why rebuke the masses who are so sedulously and so profitably deluded by others most of the time?

I return now to the somewhat befuddled old gentleman who was walking home with the Listerine under his arm and who resented my attack upon its antiseptic value, but who indignantly refused for a moment to consider seriously the idea that Jesus lived, worked, and performed miracles on the North American continent. I approach Listerine not with malice but with eager curiosity. What is it? What do the advertisers say it will do? I must watch myself or I shall believe them! What do scientists say about it? What does that matter to lay consumers?

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Like many another product anointed with the divine afflatus by the advertiser's modern psychological art, Listerine enjoyed several major epochs of recommendation. I might thus mention the general remedy era, the halitosis offensive, the major deodorant campaign, and the neodandruff program. As early as 1912 a Bulletin from the U. S. Hygienic Laboratory was enabled to say regarding this remarkable antiseptic—"As shown in the above table, a 20 per cent solution of Listerine did not kill *B. typhosus* within fifteen minutes. The determination of the coefficient is impracticable." This is a polite, scientific way of remarking that as an antiseptic Listerine is a very pretty pink liquid.

Again in 1925 these eloquent words from Torald Sollmann, certainly as good a pharmacologist as this country has at present, arrest us, and open another of the windows of Heaven for our contemplation of strange scenes:

What a fine antiseptic odor and taste are possessed by thymol! After comparing the odor and taste of a saturated solution of thymol with a 5 per cent solution of phenol, or a 1 per cent solution of corrosive sublimate, could one doubt for a moment which is the most active? Evidently not, for thymol, plus small quantities of boric and benzoic acid, under the name Listerine, sells at a dollar a bottle. It is really too bad that the bacteria cannot recognize a superior antiseptic as well as the nose—for, according to the bacteriologic test, as quoted by Wood, four hundred and ninety-five dollars' worth of Listerine has the antiseptic action of a cent's worth of corrosive sublimate; or fifteen dollars' worth of Listerine equals a cent's worth of carbolic.

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At this time Sollmann was studying what he called "Bottled Psychotherapy." The economic considerations he adduces are important, but let us not be detained here in our pursuit of science.

Quite suddenly in September, 1929, a very much esteemed British medical journal, *The Lancet*, published in its "Reports and Analytical Records" an examination of Listerine by the method developed by Dr. George F. Reddish who, in 1931, was bacteriologist for the Lambert Pharmacal Company which, curiously enough, manufactures Listerine. *The Lancet* laboratories claimed to have determined the killing time of and the number of organisms killed by Listerine; by animal experiments the antiseptic was also shown to be perfectly safe for use in all body cavities, a statement supported, however, by no reliable scientific evidence. The article also said, "The statement of the manufacturers in regard to the killing time of various organisms is substantially correct. The actual number of micro-organisms killed in 15 seconds by the undiluted antiseptic exceeds that claimed by the manufacturers; over 600 millions were found to be killed in the 15 seconds time limit compared with the 200 millions mentioned by the makers. The antiseptic has been proved to be perfectly safe for use in all body cavities."

That seems sufficiently plain. Almost at once I caught myself believing it. Then I hesitated and asked myself what it was that I believed. Obviously I had come to believe the advertising statement that Listerine "Kills 200,000,000 germs in 15 seconds." I analyzed that and

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found it possible to transform it into this— "A bathtub full, or a tankcar full, of Listerine will kill 200,000,000 germs, regardless of whether the germs are harmful or not." The windows of Heaven began to close. Big figures really mean nothing in this case. The statement itself is meaningless—viewed scientifically. Please remember I am not speaking economically now. Antiseptics which will pass minimum laboratory requirements as tested in glass will kill a billion four hundred million germs as quickly as they will two hundred millions. Let the manufacturer claim what he will, the bigger the test-tube, the more antiseptic you use, the greater the number of germs you can kill. The brethren at the forum I mentioned in the beginning were talking sense after all, perhaps.

Anyway in April, 1931, the laboratories of the American Medical Association, professing shocked surprise at the cupidity of manufacturers and the ethical deficiencies of *The Lancet*, came back with a tremendously impressive chemical and bacteriological examination of Listerine. The formula of the stuff is secret. The statement of constituents to be found on the bottle is without quantitative significance. No druggist could make up a duplicate liquid after reading that. Chemical analysis disclosed that 1,000 cubic centimeters of Listerine contained about 23.4 grams of boric acid, 0.4 gram of benzoic acid, 280 cubic centimeters of alcohol, 0.375 gram of menthol, 0.75 gram of thymol—which smells so antiseptic, 0.8 cubic centimeter of eucalyptol, 0.1 cubic centimeter

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of methyl salicylate, and 10 cubic centimeters of baptisia, or what is sometimes called wild indigo fluid-extract. Finally, boric acid is a very mild and unimportant antiseptic, and a weak hydro-alcoholic solution of thymol would be just about as effective.

The antiseptic action of such a liquid is infinitesimal compared to that of really good antiseptics. Seldom used in full strength, it even then has little merit. Diluted in the mouth as it normally is from two to ten times, with saliva and with water, the modest antiseptic claims that could be made for it altogether disappear, and it is absolutely without antiseptic action. Poured in undiluted form upon 200,000,000 germs Listerine would undoubtedly kill them in 15 seconds, as *The Lancet* declared, but so would any number of other weakly antiseptic solutions. The point is that such tests have practically no relevancy to the possible action of the antiseptic in question as normally used in the mouth, or in a body cavity. *The Lancet* did not follow through. Its reticence was singularly discreet.

I might go further. I believe I shall. There is no scientific evidence that any antiseptic will cure bad breath; this is usually a symptom of infection or of a basic pathological disturbance. There is no good evidence that douching the nose and throat even with efficient antiseptics will prevent coughs, colds, influenza, or sore throat; the effects of such a process are momentary, old germs remain, and new germs readily and quickly re-enter the douched passages. There is no good evidence

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that any antiseptic will prevent or cure dandruff which is a disorder related to constitutional factors, errors in diet, disturbances in glandular functions, and similar deficiencies. Finally, there is no evidence that any mouth wash, or toothpaste for that matter, will prevent or cure dental caries, pyorrhea, gingivitis, or similar disturbances in the oral cavity more commonly designated the mouth.

Why use Listerine at all then? Why not use, say, Pepsodent Antiseptic, so highly recommended by the comic antics of Amos and Andy? In passing I might say that Pepsodent Antiseptic, which is so powerful according to its makers that it should be diluted before use, is, according to the testimony of the same makers, a 10 per cent boric acid antiseptic, thus making it even weaker than Listerine. "The phenol coefficient of Pepsodent Antiseptic is ridiculously low: 0.15," I also read. What can be the matter here? I think we are on the wrong track. Occasionally for relaxation I read that alluring organ of the advertising business, *Printers' Ink*. Among other issues I saw that of March 26, 1931, and I think it carries a solution to our present difficulty.

Therein I found an article by President John L. Johnston of the Lambert Pharmacal Company which explained that his company spent practically nothing on advertising in 1920 and earned only a paltry \$115,000; in 1930 the company spent approximately \$5,000,000 on advertising and it then earned \$7,132,412.55 net after the deduction of taxes. President Johnston remarked that every adver-

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tising dollar spent on Listerine simply must return home with a profit. It was sent out loaded with halitosis or dandruff propaganda, depending upon which pulled best, and its instructions were to bring home the bacon. Every advertising statement, he declared, "must be plausibly true," and he retained a laboratory staff to test the verity of each in turn. He also explained the launching of Listerine toothpaste, a product which the public refused to accept in the familiar Listerine flavor. The paste was then made up in several experimental flavors and the one the public liked best to eat was set upon permanently. This was not Listerine, but they called it that, and their toothpaste economy gag advertising proved immensely profitable.

In the same issue of the same journal I also found an editorial entitled "Price Is Still the Basis." Herein I read, "In spite of the efforts of national advertisers to tell the story of quality with all its ramifications and to use quality as an argument against the private brand, price is still the basis of the private-national brand controversy. Price is what interests the wholesaler, because price means profits. Price is highly important to the retailer because to him, also, price means profits. To the consumer price, in a time when a dollar has to buy a dollar and a quarter's worth of value, is an all-important factor." I think it would be fatuous, or even superfluous, to say anything further. In bringing scientific witness forward to bear upon such a matter as the value of Listerine the American Medical Association is as wrong-headed

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as I should have been had I contested the statements of the Utah Latter Day Saint on a basis of the positive evidence regarding the works of Christ given me by my Sunday school teacher.

Scientific evidence is irrelevant here. We live in a profit economy. We are essentially and, I believe, still predominantly irrational rather than rational in our beliefs and in our actions. Listerine has very great value—to wit: 1. It contains thymol which has a charming anti-septic odor; 2. it makes mouths taste cleaner, better, and sweeter, momentarily; 3. it produces impressive profits for the Lambert Pharmacal Company. We have discovered, I think, that the very finest knowledge is only ignorance when it is wrongly applied; just so it is possible that the grossest ignorance may be the knowledge of the uninformed. Let us pursue this curious conflict between knowledge and ignorance, or between different types of belief about the same basic phenomena, somewhat further, using various examples drawn from common life as illustrations. It is possible that we may finally reach a point where we can analyze belief more intelligently and arrive at some useful conclusions regarding it.

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CHAPTER II

LO THE POOR CONSUMER!

AS I think I have already demonstrated, I am a person to whom belief comes easy. Indeed if you look at me sternly, and say something seriously to me, I can believe almost anything. This is not an acquired habit. I did not begin by believing slightly improbable things and gradually work up until I could nonchalantly believe absolutely impossible things. I was born that way. It was a trait buried in my chromosomes somewhere between the genes—Gene and Eugene I suppose,—a thing inherited from some early Puritan ancestor with religious convictions so firm that he could believe the impossible almost instinctively. Naturally, with this equipment, I fall easy prey to advertising as well as to any other sort of propaganda. Inevitably I believe. Then I have to go through a long and devious process to analyze my belief, rid it of its more spurious elements, and decide what fraction of it I may safely keep in permanent stock.

Just as a passing instance let me quote here "Stipulation 0119 (Public Record)" issued by the Federal Trade Commission for release to morning newspapers (which doubtless altogether ignored it) Friday, September 25, 1931.

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Queen City Laboratories, Cincinnati, advertising and selling a cement for patching and mending clothing, has admitted in a stipulation agreement with the Federal Trade Commission that a number of representations made by it to the public to induce men and women to undertake to sell this cement from house to house are wholly incorrect in some respects and greatly exaggerated in others. The organization agreed by stipulation to cease publishing false advertising and to stop designating its product as "sewing." No longer will it be asserted in publications that a prospect will or can make \$2 an hour; that the respondent maintains a laboratory in which its product is prepared for sale; that it is the sole licensee or patentee of the product; that a prospect will average \$50 a week either in spare time or other ways, and that a person will make or has any likelihood of making \$12 to \$18 a day profit. Respondent agreed to cease using other erroneous representations and to discontinue use of the word "laboratories" as part of its trade name, until such time as it actually conducts a laboratory for research or manufacturing purposes.

When I was young and in my prime I readily believed the sort of advertising that is so ruthlessly exposed as fraudulent by the dignified and austere language here used, and which is so characteristic of governmental documents. In fact, I constantly harried the neighbors to buy all sorts of notions and gadgets in my efforts to make some extraordinary sum daily, or weekly. That habit kept our family constantly moving around town to get into neighborhoods where I was still unknown as a local pest immune to arsenicals and icy stares—that is that habit, and our infrequency in paying rent, both together brought about a certain mobility in our household. But

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I lived to enter a laboratory of research. There I learned to analyze beliefs, to pick them doggedly to pieces, and to see what I had left after cold, scientific examination in the light of facts. There I was often fooled. I began always as a skeptic, willing to believe anything, indeed believing everything. I ended up as a chronic annihilator of beliefs, sometimes almost too frightened to believe in the reality of my own existence. In spite of this, advertising statements in print still possess a remarkable power to allure and sometimes to seduce me, along with millions of other consumers.

And, in case you are unaware of the fact, consumers are pretty well demoralized these days. Writing in the Autumn, 1931, issue of the *Yale Review* on "The Vices of Free Competition," Philip Cabot said this:

There are two sides to a market, and although we have made progress in rationalizing our methods of production, we seem to have destroyed with one hand what we built with the other. While striving to integrate and control supply, we have disintegrated and bedevilled demand. Advertising, instalment selling, credit, and high-pressure salesmanship have produced chaos on the demand side of the American market, and it is hardly surprising that forecasting and foresight in such a field should prove impossible. Stimulated by both the price and the sales appeal, demand has become capricious, if not hysterical. For the violent changes in demand which upset our calculations we have no one to blame but ourselves.

Now if I am hysterical, and I half believe that I am, and have become capricious in my demands, it is simply

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because I have been bedevilled by so many beliefs, ready-made for me by enthusiastic advertisers who are quaintly economical of the truth, that I have become a befuddled consumer. For whatever else I may be in moments of strength or lapses into weakness I am, to producers and advertisers, merely another consumer. I tremble when I think of it. They have all the prestige, all the money, all the salaried psychologists, all the technique, all the shock troops and all the propaganda; here I stand alone and unprotected, trying to salvage a trivial percentage of my earnings. Of course I have read *The Distribution Age* and *Your Money's Worth*, but they somehow seemed remote; they left me "intrigued," if I may so say, but calm and unperturbed. For real nervous anguish, however, I strongly advise that you try *Printer's Ink*. By pure inadvertence a copy flowed across my desk, well secreted among the drab and incomprehensible scientific journals which ordinarily navigate it alone, and in august silence and majesty. Just by mere chance it fell open to a page entitled "Making the Salesman's Calls More Effective," and that brought me up with a start. It is precisely the opposite of what I am trying to do, yet here I find James A. Worsham deliberately and with malice aforethought putting salesmen (of all people they need the information least) up to new ways of assaulting my purse. A "checkup" had revealed that too many of the salesmen's calls were mere friendly visits; something obviously had to be done about that. So there follow forty-nine questions any good salesman must be able to answer

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affirmatively concluding with: "Did he sell *you* on the idea of going away without an order or did you sell *him* on the idea of needing more heaters and refrigerators?" It is plain they are out to get me going and coming. Hot or cold I am it.

This offensive assault on my solvency has gone on long enough. I am losing my temper. Psychologists tell us anger is akin to fear. Of course it is. I come now fresh from *Printers' Ink** and I am very much afraid indeed of the massed attack on my pocket-book being planned there. I deplore the vicious nature of this attempt to get me to buy cameras to match my topcoats and other things I do not want, and thus to penalize me for market saturation, for which I actually am not at all to blame. If mechanism has so far outstripped capacity to buy that only strong-arm methods will any longer compel people to purchase what they do not want, I prefer to be an innocent bystander—if not so innocent, at least a bystander. But I fear I shall not be left in peace much longer.

First of all there is Thornton Lewis telling "Why We Cut Our Mailing List Two-Thirds." Why did the York Heating and Ventilating Corporation do that? They probably had me in mind all the time. They wanted to get me all heated up, delete a few dollars and then give me the air. They didn't cut my name off their mailing list. They starred it three times, I well know, for right now I am continually bombarded by mail with weighty

* This was the issue of April 11, 1929, printed right at the time when Mr. Cabot accuses advertisers of bedevilling demand.

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and expensive advertisements of goods which I do not want, could not use and which usually are entirely inappropriate to my mode of life. Thus, being a writer and an editor, why must I be a target for the discharge of samples of drugs and chemicals and lithographed expositions of surgical apparatus? Being constitutionally opposed to squashing a cockroach (I don't like their crackle), why should I be besought to buy new firearms for my fall hunting that never has taken place and never will occur, etc.? Being childless I am uninterested in infant equipment; being sedentary, sports goods vaguely annoy me—yet I am regularly asked by mail to buy not only these but also stanchions to secure cows in their stalls, though I find cows somehow terribly out of place in a small apartment.

Well, the Ventilating Corporation cut its mailing list two-thirds to make its salesmen come in and plead tearfully to have new names put on it. That's what Mr. Lewis says, and come they did, and plead, and soon the salesmen had built up in them "such a feeling for the importance of direct mail" that the list was larger, and fuller of low-resistance sales prospects than ever before. Very haughty are these business men when they go after my money. They won't even keep my name on their mailing list unless a salesman pleads for me, blank blankety blank them! Can you imagine my prostration with grief if half a hundred firms who regularly clutter my mailbox with catalogues I can scarcely get into my small apartment, and from whom I never buy a thing, forgot I was alive?

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But there is more to come. The "Realsilk" Hosiery Mills threatens to get past my butler, when and if I ever have a butler. Of course, advertisers will try to see to it that I never have enough left to get one, but then . . . It appears that if I ever do elude these cunning dollar trappers successfully enough to hire servants, I might gain some protection from salesmen. House to house canvassers seldom get past butlers, it seems. But they must pass, so Realsilk says a firm should have a social secretary who can prepare a really refined letter asking me, or my wife, for an appointment when we get rich. It will be a letter we cannot afford to resist. It will be a fetching letter. Then comes the salesman, the stockings are sold and the butler is foiled. So even when and if I manage to get rich this offensive will get me.

Eugene Pharo, editor of the *Confectioner's Journal*, also brings up an interesting point in his: "Is 'Advertising By Attack' To Be Made a Recognized Policy?" Well is it—and what is it? It seems that when a tobacco company says "Reach for a Lucky Instead of a Sweet" that is "advertising by attack." It would be well enough, of course, if the attack were merely directed against me, the innocent bystander-consumer. But it is not ethics, it is not even sportsmanship, when it is directed against another advertiser!

So far has this dreadful custom gone that in *Printers' Ink* for April 4 the American Cigar Company advertised "Reach for a Cigar Instead of a Cigaret," and said "Cigarets for the Ladies," and "Let Ladies and Boys

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Smoke Whatever They Want." In short, "Roi Tan" advertised itself so strongly that it exchanged blows with another American Tobacco Company subsidiary. The thing is getting too cannibalistic or internecine and Mr. Pharo says it isn't right. Both Roi Tan and Lucky Strike should be punching me instead of confectioners or each other. I am always legitimately open to attack. There is no closed season for hunting me. I am a mere consumer. I'll believe anything! "On immediately pragmatic grounds," continues Mr. Pharo philosophically,

On immediately pragmatic grounds, those of results, there does not seem to be any quarrel at all with the principle espoused by the American Tobacco Company, its officials, and its subsidiaries. Among manufacturers and distributors of the products concerned there is really none. It is all a glamorous and merry game by which everyone concerned manages to "get his." The consuming public in the meantime is having its ears kidded off; just as it used to have them kidded off by P. T. Barnum, and on the assumption, too, that those ears are very long; in fact, almost as long as those of a jackass. (It is plain that I, the consumer, command a very moderate amount of respect here.)

When analysis has advanced to this point the real question at once appears. It is whether the advertising profession shall countenance insincere and fallacious advertising appeals just because in some special cases they meet with success, or whether all examples of insincerity and buncombe shall meet with immediate condemnation from readily recognized authoritative sources.

May we wonder in passing what these "readily recognizable authoritative sources" are and why buncombe is

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especially offensive to confectioners just at this time? For at another they will not hesitate to advertise—eat candy and avoid fat, for fat burns in the flame of carbohydrate; they will quote—or rather misquote—a scientific book to support this erroneous advertising contention. They have done this and the scientist whose book the confectioners garbled wrote to *Science* and also to the *Journal of the American Medical Association* to disavow such fraudulent methods of advertising.*

But, Pharo hastens to add,

The point I seek to raise can be divorced from moral or ethical considerations. Cold common sense, if it be directed solely to the sustaining of permanent value in advertising, leads to the belief that when the public is aware that some advertisers are appealing to it with their tongue in their cheeks, it must assume that any advertiser may be doing the same thing.

Yes. I, the consumer—the great public—commence to feel that way myself. I begin to believe, as Mr. Pharo suggests, that advertising is eighty per cent buncombe, but it frightens me none the less, especially when it drops moral and ethical considerations overboard so casually and so unmistakably. For that reason I am glad that W. E. McFee of the American Rolling Mill Company has begun to wonder about the effectiveness

* *Journal of the American Medical Association*, February 16, 1929, page 579, contains the letter of protest written by Dr. Meyer Bodansky when his textbook was misquoted by confectioners for their own purpose in advertising sponsored by the Research Department of the National Confectioners' Association in the January 19, 1929, *Saturday Evening Post*.

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of slogans—he calls them “metaphorical pyrotechnics,” of course, in the brief, snappy manner affected by all big business men.

It seems that an article in *Top* (“really meritorious house magazine”) advised the use in advertising copy of—

“Thoughts that breathe and words that burn—copy that convinces and conquers—make these your quarry and hunt them by your fireside.”

and also of—

“Words, cut by a madman’s ax, words brittle with ice;
Words, pointed, barbed with sleet and torn of branch;
Words that cascaded, ricocheted, and split,
Fell in avalanche,
Down with the flood of wrath they pitched and plunged—”

But, says McFee, when a reader scans a piece of copy and says: “That is a good advertisement,” ought the advertiser to pout his chest proudly or should he look around for something different? (What a reflection that is on my consumer intelligence!)

The answer to that question is another question: Is the reader impressed with the magic words of the copy or impressed with the advantages of the product?

And the answer to that determines whether a piece of copy is worth its salt or whether it is merely a boat-load of impressions wallowing in a sea of brilliant and bombastic jargon.

So Mr. McFee continues plaintively:

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Words . . . words . . . words. More power to their cogency, if they be means toward an end. But not, lest advertising perish (high eloquence) a boat-load of impressions wallowing in a sea of brilliant and bombastic jargon.

Screeching meteorites and booming satellites! . . . Is this the new responsibility which confronts us—creating advertisements that people “learn by heart”—and spiel off as after-dinner stories and bed-time ditties? Must we teach our readers by rote so we can carry off the prize we seek—a good, healthy slice of the consumer’s dollar?

Now we are out in the open. My enemy frankly admits what he is after. I am no longer in the dark. Well, shall he carry off a large hunk of my dollar with his mere words?

These are ponderous questions. It is curious they were not propounded to me. Am I of no moment at all? I seem eventually destined to be the target for all this ammunition. Why not consult me and ask me just what verbal bullets lay me low quickest? Perhaps words “pointed with sleet” might leave me cold, while if “brittle with ice” they would convince me at once, who knows? I’m sure I do not. But I would like to know.

Probably the testimony of Lady Astor, Lindbergh, the Queen of Rumania, or Babe Ruth would convince me more easily anyway, though the *Journal of the American Medical Association* contends many people were convinced of the effectiveness of a widely advertised stomach ulcer remedy by a spontaneous testimonial which appeared in the issue of a Detroit newspaper following the one that contained the death notice of the victim who was

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healed! * You can't tell about me then. But Stanley Resor, President of the J. Walter Thompson Company, has thought of that.

He says testimonials have human interest, and human interest, like Lindbergh's two ham sandwiches and his lack of pajamas, fascinates and enthralls me—the consumer. It charms me, like gossip. I want to know what my idol eats for breakfast! I want to emulate Captain Fried if he says he smoked Sternup Stogies, whether he actually smokes at all or not. I want to use the toilet soap and cold cream and beds (not the same beds, the same kind of beds) used by Mme. Vanderslapp, and I simply must read the books the “best people” read.

Of course there have been abuses and misuses of testimonial advertising, some of them flagrant, just as there have been of every other type of advertising. No scrupulous man would defend the sins committed in the name of testimonials any more than he would condone abuses in other forms of advertising. . . .

Must testimonials be spontaneous and unsolicited to be legitimate? The answer is that very little that is worth while in this world is secured without solicitation. Sales volume, charity funds, wives, even justice, are obtained by asking for them, not waiting for them to happen.

Hence the testimony must be solicited, just as the really good editor solicits a manuscript. The best manuscripts,

* See “What Are Testimonials Worth?” in this *Journal* for March 16, 1929, where, by the *Detroit Free Press* of Feb. 17, 1929, Peter J. Clemens announced he had been cured of gall bladder and stomach trouble with “Theronoid,” while the issue of the 18th announced Clemens' death the day before!

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says Resor, are often written by ye editor or at his earnest solicitation. However,

Every conspicuous testimonial advertiser is deluged with offers of endorsements from the great and near-great and would-be great who want to break into print. Even if some of this spontaneous material is otherwise usable, it must be checked carefully to see if the testimonials are really sincere.

This points a way to get back at advertisers if I can just arrange to become great. Then I can make them pay me good money to testify to the excellence of products I do not use in words I do not write. But, being insignificant, my present problem is to remain solvent.

If the endorser is insincere, it is unfortunate—but does it really hurt sales? That I should like to know—and am not told, though I find paid endorsements are useful. But—

Does testimonial advertising prepared as outlined above abuse the confidence of the reader and eventually lessen his belief in all advertising?

These same questions were raised ten years ago about the editorial style of advertising. A decade ago we began to approach the reader from his own point of view, instead of the manufacturer's. To do it successfully we adapted lay-out styles used by editors, just as we are now once more using an editorial device that readers want; personalities. When we made our advertisements look like editorial matter ten years ago, there were many adverse criticisms. It was said in some quarters that people weren't going to read advertisements any more. But they are now reading three times as many, a large percentage of them cast in the same editorial style we pioneered in.

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The gentleman may be President of the J. Walter Thompson Company, one of the biggest guns of the propaganda advertising fraternity, but he is all wet if he thinks he has this consumer fooled any longer. He surely gave the game away that time, for even I, jackass though I be and liable to believe almost anything, can see that it has gotten to the point where it is impossible for me to tell when I am being edified or instructed and when I am being victimized, bamboozled, or propagandized. My lot is hard enough but the worst is even yet to come—the very very worst.

Mr. Ed Wolff asks "Is Selling Ability Over-rated?" and he answers himself "Do people buy for what a product *is* or *does*?" Then he addresses me, the consumer—

You're wearing a hat that you paid \$10 for. (I deny the aspersion but let that pass.) How do you know it is worth \$10? How do you know that the quality of felt and workmanship don't make it worth \$11? Or \$9? The shoes you have on cost you, let's say, \$12. (This is a wild shot, too, but I'll defer protest till later; let's say \$12 then.) What grade of leather went into them? What grade of findings? (What are findings? Let's not get technical; we won't go into that.) What grade of workmanship? You don't know. (He is obviously talking to me all right; I don't.) Your only answer must be, "I bought from a reputable house and the goods gave me satisfaction."

You can see that if he hasn't got me already he's plainly going to get me. Why? Because—poor fool—I buy for what the product *is*—not what it does—that explains my cracked Rural-Tex walls, my peeling shellaced

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floors, my worn kitchen and bathroom enamel, and my execrable typewriter. I bought them from "reputable" dealers; they all turned out rotten and Mr. Wolff well may ask:

Are typewriters sold on technical excellence? You've bought a number of typewriters, probably. Do you know the steel alloys that went into them? The number and positions of the ball bearings, if any? As a matter of fact, didn't you buy on the performance of the machine rather than on its components? I venture to say yes. But the performance is a thing that nearly anybody of good sense can demonstrate—it didn't require a technical man. What was needed was a salesman—a man who could get to you, could arouse your interest, could get you to say, "If it suits the steno, I'll buy." That's sales ability.

I venture to say I am very ignorant of these things and I was convinced with undue haste. I shall never be so softhearted again though. On looking the matter up in the technical press I did discover that presumably similar typewriters of exactly the same make repeatedly went forth from reputable companies which were fifty or a hundred per cent more difficult to operate than their sibs in this bio-mechanical line. This was caused by the fact that leading typewriter firms were so busy creating consumer belief in the excellence of their wares that they did not have time left to make simple mechanical adjustments on the machines before they went forth to the trade.

But here is a more diverting revelation still.

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The maker of an unbreakable watch crystal doesn't permit his salesmen to know the material used in his product. Their technical education is simply this, "Our crystal is not celluloid, and competitive crystals are. We guarantee our crystals not to break or grow dark." This outfit engages only salesmen who have a record of successful selling among jewelers. Surely here is a clear test of technical knowledge against selling ability. What is the result? This concern is by far the biggest in its field. It sells all over the world. Is the product better than competitive items? It ought to be; it costs the retailer more. But how can the salesman prove it to a new customer? Not with technical facts, for he has none. He simply has to sell. Being a salesman, he does. . . .

Give two identical shoe samples to two men, one a real salesman who can convince the dealer that here's a chance for volume and profit, and the other a man who can talk leathers and findings and workmanship, and who will get the order? The dealer is in business for profit, isn't he? He'd sell paper shoes, if they'd please his customer and yield him a satisfactory income, wouldn't he?

Those consumers in favor please answer in unison HE WOULD! In fact, he has—on several occasions—to me. He got sales volume and profit and I got paper-soled shoes. Down with technicians! But . . .

But suppose Mr. Teknik knows all about the making and the quality of radios and he goes forth to sell in competition with Mr. Sales who knows nothing of quality or technical matters, but could sell fifty cent pieces at a dollar and a quarter apiece? Who will win out? I, the consumer, am overstocked anyway; I do not want any more radios; I especially do not want any of a new line

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of radios. Can Mr. Teknik batter down my arguments? He cannot, because he is intelligent enough to see my predicament; as Mr. Wolff says he is "sunk." But how about Mr. Sales? Ah. He may have a poorer radio but he can sell me profits, growth, prestige, says Mr. Wolff. Teknik can tell me the scientific why of his radio and demonstrate it to be of finest quality; but Sales can make me buy "and who cares what the reason is (for my buying) anyway?" Not Mr. Wolff, obviously!

The secret may now be considered out. Is selling ability over-rated? No, emphatically no. Positively *not*. Let Mr. Wolff continue:

Who is paid the most money, the man who sells the goods or the man who produces them? Why do the bigger rewards go to the salesman? My answer is that it's a matter of supply and demand. You can get more good technical men than good salesmen. But if technical men can replace salesmen, if sales ability is over-rated, why are employers everywhere willing to pay salesmen sometimes three and four times as much as they pay for a comparatively good technical man? Why don't they fire the costly salesmen, sending out the less expensive technical men to get the business? The answer must be, I believe, that salesmen can sell more goods.

The salesman, of course, has very especial and marvelous gifts, according to Mr. Wolff. Thus a traveller is reported to have sent the following letter to a soap maker:

We all need to live, I admit, but don't you think 35 cents a tube is a little too high for atmosphere?

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In San Antonio, Texas, two weeks ago, I bought a tube of your shaving cream. At least, that's what I asked for. But when I started to use it on the Mallory boat coming up from Galveston I found a little gob of shaving cream in the front end of the tube, and a little gob of shaving cream in the other end, and air in between.

I thought maybe you were turning out a new-style product, so I took a brushful of that air and tried it out, but it would not make a lather.

Of course, I could go back to the dealer and demand another tube; but, firstly, I forget his name, and, secondly, I don't see much profit in making a \$300 trip to replace a 35-cent tube of shaving cream.

Now, would you prefer to send me a round-trip ticket to San Antonio so I can make my claim to the dealer, or a new tube—one with shaving cream in it?

I have instructed my attorneys not to bring suit until your Board of Directors has had a chance to meet and settle this question of policy. Meanwhile my beard is growing and—due to my appearance—my wife's ardor is cooling rapidly. I'm in a dickens of a fix.

That letter would have floored a scientist or technician, says Mr. Wolff; at best he would have written a dry, technical dissertation of the theory of filling machines and how an occasional bubble of air got into the best regulated tubes. But a salesman has a sense of humor and he writes—

Receipt of yours of Feb. 28th definitely convinces us of the futility of attempting to merchandise air at the price of shaving cream.

We are sending you under separate cover two regular tubes of our well-known product, and trust that in the use of them

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you may be in a measure repaid for the trouble you have taken in calling this matter to our attention.

I have met that salesman myself. He once gave me two bottles of ink free, each twice as large as the original bad bottle they were to replace; he has given me so many replacements and cash refunds from mail order houses that I am sure his firm values making refunds more than it does filling orders properly; he has presented me with a new fountain pen without even demanding the return of the defective one. But I have also met his brother who snarled at me, refused to treat my complaint with courtesy and had no more sense of humor than a cytologist. It all depends. But the fact does stick out, in my experience, that products must be made very cheaply, and profits must be enormously high, to permit such lavish and ready replacements and refunds on the part of certain firms with which I have dealt. I am sure some of them pride themselves so upon the perfection of their replacement and refund department that they flagrantly neglect the little matter of getting the customer goods of proper quality in proper amount in the first place. This all goes to show that cost of production is often a very minor question.

It all comes down to this. I am a lone consumer without specialized knowledge. I want to buy good merchandise. Hundreds of rich manufacturers and merchants consider their sales force more important than their technicians, their selling more important than their produc-

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tion, and they assail me by house to house canvassers, postally, by radio, by slogan, by testimonial and by all means known to modern psychology to take advantage of my ignorance of quality and materials. Remember I am not saying this now; I just showed that they say it themselves. What can I do? Am I not in a devil of a fix trying to protect my cowering and emaciated pocketbook from such an onslaught? Who can assist me? The Bureau of Standards could, I am told—if it would publish its findings. So say Chase and Schlink. But it is very careful not to publish them, so what of that alternative? It offers me no avenue of escape. What does point a way out? Does anything? I offer two examples.

On a billboard I see advertised a ginger ale. The advertisement says, "Would you eat a green apple? Then why drink unripened ginger ale? Whofitt Ginger Ale is aged six months. It is rare in bouquet as old French wines." I ask is it aged? I ask what good if it is aged in glass bottles anyway? I ask is "green" ginger ale like an unripe apple? I ask is aged ginger ale like an old French wine? I ask the United States Food and Drug Administration and they say:

"Run along you naughty public and play consumer obediently as you should. Don't you know you are always it in this game of tag and that the big advertising men are out to tag you seven days a week? You saw that advertising on a billboard, or in a newspaper, or on a car card, or it was yelled at you from a radio loud-speaker. That lets us out. Unless you see such things

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on the label of the bottle or in the advertising matter sold right along with it, it is outside the jurisdiction of the federal Food and Drug Act, anyway, whatever its character." *

"All right," say I. "But please, Mister, tell me how I can navigate so as to come within the three-mile limit of your funny little law." I ask innocently; I ask to know; and so the Food and Drug Man, seeing I am earnest, holds up a jar of preserves and says to me, "Read the Label." I do so and it says "Compound Pectin, Sugar and Raspberry Jam. Prepared from 20 per cent Pectin Solution, 55 per cent Sugar, and 25 per cent Raspberries, with Fruit Acid Added."

"Now, you funny consumer, what have I in my hand?" he asks.

"How should I know?" say I. "That stuff probably has no raspberries in it at all. I bet it's old automobile tires ground up and mixed with waterglass and a little brick dust. You can't catch me. I don't believe labels any more. I have read *Printers' Ink*; there is no Santa Claus in any factory. I have had shirts marked 'English Broadcloth' and I know what they really were. O no; you can't fool me in labels. I've been educated."

But he just smiled and then explained to me how

* It should be said here that a ginger ale manufacturer who made an ale which he advertised as "Aged Six Months" not long ago signed a Stipulation Agreement with the Federal Trade Commission promising not to advertise it again in these words until such time as it actually was aged six months; unfortunately the name of the ale making this advertising claim eludes me; I hope it occurs to you readily.

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wrong I was. I was wrong. The Food and Drug official was right. The label was right. It told the God's truth! In fact, they can't fool you on raspberry jam any more, or maple syrup, or vinegar, or sardines, or asparagus, or salmon, or anything like that. They are what they say they are on the labels and they weigh what they say they weigh, and if you buy compound jam for real fruit jam and get seven ounces when you think you are getting a half pound, it's your own fault for being too dumb to read a plain label.

That points a way out, then. And when we consumers wake up and start to buy for what a product *is* rather than hoping for the best and buying to wait and see what it does—there will be more of such regulatory standards. And when such regulations fix quality and quantity standards for commodities, there will be vastly less advertising and I can protect my pocketbook easier. And if a concern's advertising was strictly limited to a small and very modest percentage of its total running expenses more attention would soon be paid to standards of quality than to selling technique. But as things are I am a pretty much unprotected consumer and the metaphysical wiles of advertisers constantly threaten to make me believe things even more nonsensical than those in which I invest faith on my own initiative.

CHAPTER III

SEASON WITH HOKUM TO TASTE

THE last chapter, I think, forcibly brings up an interesting question. This concerns the utility of metaphysics and mysticism in the production of the beliefs it would serve our financial purposes to have other people entertain. For after all what is called advertising psychology is in reality an effort on the part of manufacturers to feed their public types of metaphysics and mysticism likely to convince them of the inerrancy of their claims. Or, to get indecently personal, since I do not absorb readily the same type of mysticism that appeals to you as direct revelation from out an heavenly window, something must be produced to appeal to me. But if I happen to require a type of mysticism that is quite unique, or even rather rare, it would probably prove unprofitable economically to fool with me anyway. My laboratory training will tell on me, however quickly I tend to believe on first exposure.

Thus, suppose I come face to face with "The Highest Technique of Concentration, Meditation, and Spiritualization of the Body" taught by the celebrated "Educator-Psychologist-Metaphysician," Swami Yogananda, emissary of the "Honorable Knight, Sir Manindra

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Chandra Nundy, Maharajah of Kasimbazar, Bengal," I am not immediately floored into a state of supine conviction even by this formidable array of verbosity. When this august and rotund gentleman speaks to me mysteriously about so attuning my *medulla oblongata* with the great cosmic reservoir of energy that the molecules composing my body go into reverse vibration, I remain unimpressed. When he recommends that I undertake the investigation of dematerialization, and of the sense of levity that will so replace my ordinary gravity as to enable me thus magnetized to walk upon the water, I may snicker imperceptibly behind a judiciously upheld fan (I always carry a fan for this purpose when I go to Yogi lectures) but I have trained myself not to believe that sort of mysticism.

But approach me with a type of metaphysics calculated to impress me and I shall commence almost at once to believe in the most extraordinary absurdities, until such time as I have the opportunity to analyze my beliefs. I give you three instances. They all concern papers I have read which were written by scientists who wanted them published in a scientific journal over the destinies of which I had, alas, too little control.

The first scientist had fed some sheep a poisonous weed—let us say bitter rubber weed. There probably is no such weed but it sounds poisonous at least. He found that one sheep sickened in 2 hours and 8 minutes, another 1 hour and 17 minutes, and another in 6 hours and 4 minutes, and so on. He found that the illness had a

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duration of 1 day 4 hours and 33 minutes in the case of one sheep, of 4 days 7 hours and 19 minutes in the case of another, and so on. He ultimately reported that the duration of illness of a sheep fed so much bitter rubber weed in proportion to its body weight was 3 days and 20 minutes. I read all of that, looked over his tables, and started to believe him. Then the figure "3 days and 20 minutes" suddenly struck me as rather absurd. Next I found that the man did not have his sheep under continual observation anyway. Next it began to dawn on me that no veterinarian in existence would be competent to tell that a sheep was sick one minute and well the next, or vice versa. I became dubious.

The man had tripped me up with a form of metaphysics that appeals to me, mathematical metaphysics. He had merely recorded the clock time when he fed the weed, when an animal seemed sick, and when it again seemed well. He had made the obvious subtractions; he had done the obvious averaging; he had produced the obvious deductions, with figures and curves. The only thing the matter with it was that his mathematics had too little direct relation with his sick sheep. The figure "3 days and 20 minutes" was obviously a purely mathematical average, and as such above reproach, but it had only a relative mathematical meaning. Properly explained it might some day be compared with a similar average achieved by some other worker. But to believe that sheep would on an average be sick exactly 3 days and

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20 minutes if they ate so much bitter rubber weed would be, even I saw, absurd.

In the next case a man was seeking to find the resistance of different varieties of barley to a certain rust. He exposed the various kinds of barley to infection by the rust. Then he represented complete resistance by 0, moderate resistance by 1, slight susceptibility by 2, moderate susceptibility by 3, and complete susceptibility by 4. I let him alone to see what he would do. The very next minute he had those numbers in columns and had begun to average them to show the average resistance of certain strains of barley as 3.256 or 1.342 or some other such absurdity. He, too, would have tripped me into belief, except that I was in no mood to be trifled with, having just got through with the bitter rubber man. But he had the equipment anyway, to get me going.

The last instance concerns a scientist who made an investigation to find out which method—radio, press story, personal visit, circular letter, telephone call, demonstration, etc.—was the best to use in changing the work habits of farmers. He had about the most impressive tables and figures that I ever saw gathered together in one place to demonstrate that this method was 17.86 per cent as effective as that in changing farmers' habits. I got so enthusiastic over his article that I began to run around telling people about it. Finally, I met up with a sardonic pessimist who asked me how many farmers this had been tried out on, where they were located, what percentage of the total number of farmers in the country

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they constituted, whether they were a selected or an average sample, who had judged that their change in practice was caused by this or by that agency, and how had the judgment been made. I was found several days later hiding under a streetcar near Rahway, New Jersey.

In the case of instance two the flaw was, of course, that human judgment might put certain barley plants in class 4, when they should be in 3, and that the averaged figures could not be any more accurate than the realities of rust infection the individual figures really represented. The final averages, while interesting mathematical deductions, meant nothing as directly related to rust infection. The flaw in the case of changing farm practices was similar and is so well brought out by the questions the sardonic gentleman asked me that elaboration upon them would be too painful to bear. The point I am making anyway is that everyone has his own individual threshold for metaphysics and for mysticism, and that, if you can just devise the right quantity of hokum of the correct quality to add to the belief you want to popularize, you can surely convert the masses, whether your basic message is one of fact or of pure moonshine.

Thus, I have just found out that President Hoover is a Hydrogen Man. There is no doubt about it. He is the Hydrogen Type, and that makes him reserved and silent, and gives him tapering fingers and fleshy hands. It makes his eyes calm, fills him with latent energy—or “sleeping power,” if I convey—and suggests that he should eat dry foods, go slow on liquids, avoid anemia,

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and take plenty of chlorin and calcium. He is also liable to suffer from nerve stitches. All of which convinces me that what science probably needs is more hokum in it. Science is entirely too staid and austere to be a paying proposition these days.

Scientific specialists in human nutrition who talk over the radio and write for the press seem consistently unable to make their material really attractive to the general public. Can it be possible they forget that this is an era when many churches have divorced mysticism from religion and that the public, therefore, must turn elsewhere for its metaphysics? For it is wrong to regard man as a rational animal who believes things because they are true; he is fundamentally an irrational and mystical animal who believes things because they are incredible. The proper way to make nutrition science attractive to the public is to deliver it well sugar-coated with mysticism.

It might actually be possible to foist upon the public very good science indeed if your mystic garnish was properly seductive. It certainly is possible to foist anything at all upon it, provided you are sufficiently irrational and metaphysical in your presentation. For we are not a practical people who care for cut-and-dried statements of fact. We yearn for the fanciful, for the miraculous, for necromancy, and the esoteric. We demand that we be fooled even while we know that we are being fooled, and we are actually ready to pay good money to have competent persons fool us. A great many of us, for instance, are ready and willing to pay "Price Five Dollars" for a mimeo-

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graphed booklet called "Chemicanalysis of Types and Temperaments with Key to Foods." *

By that I mean that a great many of the best of us, the above-the-average intelligence sort of people, are willing to pay through the nose for this curiously, almost scholastically mystical brochure on how to eat properly. The very title itself is certainly worth a quarter at a conservative estimate. Its attractiveness is apparent. It holds forth promise. In the face of that title what stupid dolt would invest 5 cents in "Nutritive Value and Cost of Food Served to College Students," or in "Experiments on the Digestibility of Wheat Bran in a Diet Without Wheat Flour," or "Studies on Digestibility of Some Animal Fats," or "The Effect of Palatability on the Composition of Ice Cream," or "Eggs and Their Value as Food"—any of which the United States Government Printing Office will cheerfully supply for the sum named? Indeed, if you insist, you can get government booklets on "Good Proportions in the Diet" and "Vitamins in Food Materials," but they are dismal, prosaic, uninspired documents which hold forth no promise.

Yet if sound nutrition booklets are worth 5 cents, certainly it is worth \$5 to have a diet publication which begins by telling "How the Mind, the Soul, the Spirit of Man Works Through Matter." Rhetorically this leaves something to be desired, but just think of its spiritual message to the depressed soul! Personally I delight to read next that "the strawberry is an iron plant," and to

* Published by the Hauser Institute, Inc.

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discover "the celery plant drawing to itself and metabolizing into its cells, sodium and other elements found in the soil, and storing these elements." I do not recommend the punctuation nor the syntax; it is the revelation I bring to your vagrant attention.

Next, I find discussed "The Eleven Chemicals Which Create the Eleven Types," which has the true Acquarian Gospel ring and sounds almost Rosicrucian. In the rubric I discover that Calcium "works upon food and helps to liberate the vital principles or vitamins so they may be extracted and utilized." Potassium is "cooling and anti-septic . . . it means a more efficient muscular dynamo . . . the Potassium Man is always more healthy"—than what deponent saith not, but think what it means to be more healthy, even in the abstract, much less the kidneys. Phosphorus with Sulphur vitalizes the brain and nerves. "Phosphorus is necessary for the higher intellectual activity (I begin to chew a matchhead at once) for the religious and psychic emotions as well as for the physical senses, especially those of taste and touch."

Sodium "holds Calcium, albumin and fibrin in solution, therefore Sodium has everything to do with healthy, normal digestion and assimilation." Chlorin is a great purifying agent and liberates internal heat from the muscles. "Silicon exerts a powerful influence upon the nervous system and the brain. . . . The child in whom this element is well supplied, becomes immune from contagious diseases." Let little Willie chew cobble stones instead of vaccinating him—charmingly efficient idea and prudently

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economical as well. "Oxygen plentiful and active means more life, joy, pleasure, optimism, enthusiasm. It is the life and light of human existence. The fountain of youth." Show me anything as poetic as that in a government or university publication on eating and I shall begin again to believe in scientific nutrition. Just now I am too full of emotion to do anything so sordid.

"Nitrogen is a restraining element," I find, and should make a marked improvement in our criminal population if fed with discretion. "Nitrogen alone is sluggish and weakens stronger elements. . . . Nitrogen acts as a powerful vitalizer and tissue builder and has great solvent power on body metals, enabling the system to attract and vitalize their pigments and magnetic qualities." I cannot reconcile these statements, but match their literary pungency if you can in a Department of Agriculture Circular. Carbon makes people fat; if you eat it excessively you feel weak all the time. Hydrogen "helps to regulate the tension of the gases in the blood" but "too much water in the body disturbs (I do not correct spelling; my typist must not, in this case) funtional activity of tissue and may result in dropsy." Take care how you nibble Hydrogen. But Sulphur!

Sulphur—there is an element! We shall need a new paragraph for it. It is a "volcanic" element and compels the cells to throw off toxic substances. It agitates every cell of the body slowly and cumulatively, and is widely imbibed by shimmy dancers and burlesque queens. "Sulphur is necessary to maintain a uniform temperature in

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the sexual nerves and plexuses, in the spinal reflexes, in the nerves of liver and kidneys, in the optic centers and nervous system throughout. An excess or a lack of Sulphur defeats Nature."

This leads us to the five temperaments which are the foundation of the chemical types. These are: The Calcium and Silicon Types who have oblong bones in their faces (I am telling this, not explaining it now); the Potassium and Chlorine Types whose faces are oval-muscular; the Sodium Type with a wide, triangular, "ligamentous" face; the Carbon, Nitrogen, Hydrogen, and Oxygen Types with a circular vital face, and the Phosphorus-Sulphur Type with a "pyriform mental" face. All told there are eleven Types in spite of the shape of their faces, and many people have been detoured from one Type to another by a swift punch in the snoot.

The majority of the Calcium Type are men. They have fine bones and lots of endurance; they concentrate and invent; they also work as blacksmiths, engineers, geologists, or executives. When angry they will fight an army and when in love there is no escape. They do things. Edison and Erickson were Calcium men; so were Abe Lincoln and Darwin; so are Henry Ford and John D. Rockefeller. They should marry tactful, talkative, lively, interesting women; they should tank up on cereals and watch out for rheumatism.

The Potassium Types are usually men also, though many are women, which seems somewhat impartial to say the least. This is the typical American Man with a con-

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structive brain who "brings order out of chaos." He has talent and builds cities. Before you know it he will have a city built and you have more slums and breadlines on your hands than I like to think about. "He is a good husband, but may have many wives," which appears to make him either a Mohammedan or a movie actor. He is genial and healthy and always has a brown skin. Schwab, Roosevelt, Shakespeare, and Elbert Hubbard were this typical American Type. He should not overeat and can marry almost any Type, as often as possible.

The majority of the Phosphorus Type are women. The Type is delicate and refined and very scarce in America. Phosphorus people are blue blooded intellectual aristocrats. This Type has "burned out the physical in favor of the mental"; weighs 85 to 125 pounds; stands four to five feet; has soulful eyes and a timid bearing; lacks vigor, fire, animation, and vim—not to mention red blood—shrinks from marriage because too elegant; eats too much sugar; suffers from anemia and heart trouble, and should subsist largely on "nice yellow olive oil."

The Sodium Type, "Majority are men, many women," is very intense "because they have a wide head." This Type has a wide face, a thin neck, an emaciated body, a pointed chin, and a bold, serious expression. "The hands are hard, stiff and usually cold." "He" may be short and tender or tall and slender or, if a woman, she may be stocky but with hard, dense flesh. The Type is lazy and relaxed, and includes "a fierce fighter, like Jack Dempsey, who was a heavyweight Sodium Type" or Billy Sunday

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"who is the religious member of the Sodium family." Prominent Sodium people are Al Jolson, Amelita Galli Curci, and Irene Castle. They are moody, serious, silent, despondent, never lukewarm, vigorous, intense, and powerful—if you can picture that. They should marry wives with warm hands and "plenty of red color in the skin." They should guard themselves against mental depression and catarrh, and eat lots of raw vegetables.

The Chlorin Type is unassociative, dark, tawny, yellowish, and not often seen in America. They are narrow and flat, weigh 100 to 125 and stand five feet six. They are hopeless and dull like Marat and Robespierre. They are not communistic, care nothing for social life, have a high sense of honor, should marry fleshy women, watch out for headaches and pyorrhea, and eat juicy fruits and vegetables. I hope you are following me, will recognize yourself, and carry out instructions. This is important; it is authentic.

The Silicon Types, "majority are men, but many women," are merry, free, unrestrained, great workers, natural, frank, outspoken, unconventional, "interested in culture and refinement," but not enough to change their habits apparently. They are romantic, do not read books, and see a bright future. They talk continuously, except when asleep, tell exaggerated fish stories, and emulate Micawber. They should marry someone who will listen to them, but who "is exclusive and dependent in a love sense." They are very healthy, except for paresis, paralysis, neuresthenia, fevers, "degeneration of the mucous

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surfaces and in solid structures"—they sort of melt away apparently, at times—peritonitis, colitis, suppuration of the bone, and other minor ailments. They should not eat cold foods.

The Oxygen Type is largely composed of loud, outspoken, dark and daring men. They ride roughshod to success, are very practical, love to eat, drink, and be merry. They are bombastic, aggressive, and communicative but dislike mysticism and the occult. The Oxygen Type may now go outside till I get through here. They love poetry, moonlight and romance. The Type is well exemplified by King David, P. T. Barnum, Ex-Mayor William Hale Thompson, and the late William Howard Taft. That will do as a sample; the exact Type will no doubt occur to you if you concentrate on those fellows. They must marry controlled, cold-blooded women of the Sodium Type; they must watch out for pneumonia and kidney disease, eat cooling, eliminative foods, and guard against high blood-pressure.

The Nitrogen Type, mostly women, are reserved and dignified; indeed often silent. They are inhibited, subdued but dictate none the less. They do not take up bone building chemicals and hence tend to become soft. They like to stay home and read. "Mrs. Woodrow Wilson is a splendid Nitrogen Type." They should get more sunshine, avoid typhoid and operations "because of low oxidation and an excess of nitrogen, causing their tissues to be weak," and eat potassium, iron, flourin, and silicon.

The Carbon Type is very negative. "The Carbon

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Woman is fair, plump and pleasing; she is soft and plastic in body tissue," and nothing is worse than a really hard woman. They live largely on desserts; they are blondes with pink skins; they are "disposed to agree with everyone—the 'yes' type" which is, in some circumstances, a recommendation and saves a great deal of time and argument. They should marry quiet, "controlled, hard-fisted" men and should watch out for anemia, diabetes and paralysis. "If they drink milk, for instance, they utilize the water, fat, sugar contents of the milk, but pass out of the body untouched, the calcium, silicon, iron and other organic metal salts contained in milk, though if they had possessed a strong mind they would take up those solid elements and organize them into their tissues. This would give them a stronger, harder body. A Calcium Man drinking milk utilizes the solid elements contained because of his strong mind and temperamental disposition. The fleshy man who has a weak, pleasure-loving nature utilizes only the organic elements—water and carbohydrates—from the milk."

Please don't get the idea that I understand that. In fact, the main reason I copied it verbatim is that it eludes me in places. I seem to get hold of it here and there but I always drop some parts of it before I have the others tightly gathered up. I thought the best thing to do would be to permit you to wrestle with it yourself. There is a message there; I feel sure of that. Try to extract it, while I go on with the Hydrogen Type, mostly women, who are cold, exclusive, distant and retiring. The Type is nega-

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tive and "the body bulk is based on excessive water in the system." "She" often weighs 200 pounds, this Hydrogen Type; "she will tell you she does not eat much—but ask her how much she drinks." Suppose you ask her; I fear I don't know her well enough. "She is always thirsty but never drinks anything stronger than beer, soft drinks, coffee and water." While you are at it ask her where she gets the beer too. She has a round face, protruding eyes, a heavy torso, wide hips, thin hair, and rinses everything she handles in water. She is a good cook, but indolent; her voice rasps when she is hoarse or angry; she often becomes a banker or a food manufacturer. Perhaps the fact that Hahnemann and Father Kneipp were Hydrogen Types will help you to get her in focus. It doesn't help me, but I like to pass on the suggestions. She is conjugal, frank, genial, companionable, dislikes company, stays at home, seldom goes out, timid, penurious, and predisposed to wheezing asthma. Perhaps it would be just as well not to consider her any further. I don't believe I can do anything more about her just now anyway.

This brings me to the noble Sulphur Type, "mainly women, some men." They are artistic, cultured, exclusive; they are changeful and spiteful; even their skin changes when their mood changes. Sulphur "throws on the surface what is internal." These people have dramatic talent; they are sympathetic, kind, impatient and irritable; they "mean better than they act" and "live in the mind"—people like Ramon Navarro, Elsie Ferguson, Mary Astor, Janet Gaynor—you get the idea, surely.

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They "have to have someone to love all the time" but they have moods of irritability "caused by the accumulation of sulphurous fumes, which must find an outlet in mental explosions." It is a good idea to smell their breath occasionally to see whether they are about to detonate. They have small livers, and suffer from weakness in the digestive tract. They look well but they need fresh air.

Of course, if you do not like plain colors there are combination Types. There is the "pathetic chemical" Type like Lilian Gish; the "isogenic" Type like Lloyd George and Jane Addams; the "nerve-motive" chemical Type like Gloria Swanson; the "pallinomic" chemical type like King William II of Wurtemberg; the "lipopheric" chemical Type like Walter Hiers or Fatty Arbuckle; the "medeic" or hunch-back Type; the "atrophic" Type like poor Major Gen. H. P. McCain, whoever he is, and the "par-genic" chemical Type, "a combination of Hydrogen and Calcium, influenced by a hereditary syphilitic taint, and a lack of flourin," like nobody on earth apparently. You may hunt these people up in the cyclopedia or meet them personally, decide what Type you would rather be and write in to find out what to eat to get that way.

It might augment your felicity, if not increase your sagacity, to know that Charlotte Greenwood is a Silicon Type, Lois Moran and Sally Phipps are Sodium, Marcellin Day is Phosphorus, Douglas Fairbanks is Sodium; Nancy Drexel and "Peaches" Browning are Carbon. Norma Shearer, Dolores Costello, and Joan Crawford are authentic Sulphur Types, not to mention Queen Marie of

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Rumania. Warren G. Harding and William Howard Taft were both strong Oxygen men, while President Hoover is a Hydrogen Type. Dr. Annie Besant appears to be a complex mixture of Calcium, Phosphorus and Carbon; Dante Gabriel Rossetti was Nitrogen; Lindbergh is a combination of Calcium and Phosphorus and George Bernard Shaw is a "strong example of this same Type."

I think that should be enough for our lesson today. In fact, if you desire to get like anybody I have mentioned you will simply have to send in \$3 more. For that you may take your choice and get "The Eliminative Feeding System," "The Master Body Building System," "The New Health Cookery," or "Reduce and Rejuvenate." If you just make "your body natural its INNATE intelligence will take from the foods the chemicals that are necessary for its own type." The trouble with most of us is that we have our bodies all confused and bewildered, and too intoxicated to pick out the right minerals. That's what Prohibition has done for us. Our bodies continually throw what they need into the garbage and subsist on something that is injurious. They have gotten as crazy as the devil and retain scarcely any innate intelligence at all.

The point I want to make anyhow is that all this is very thrilling. As the background for a diet system it is almost ideal in America of today. It affords the mystic obscurity of metaphysics for which souls crave in this hard, mechanistic civilization of ours. It makes facts palatable—for here and there you will find a stray fact

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imbedded in the system as a sort of garnish or ornament. I have known quite a large number of very nice, respectable people—people who read the best magazines, discuss problems of the day intelligently, and are upstanding lights of the community, who have found solace and health in the series of booklets, one only of which I have briefly abstracted here. I have discovered few people indeed who have found solace and comfort in scientific treatises on human nutrition. What science seems to need is some judicious seasoning with hokum to make it palatable, for plain, unvarnished facts are as revolting to the average person as so many affectionate wet dogs.

I confess, of course, that the type of metaphysics used by this diet system does not nourish nor sustain my capacity for belief. In passing I should say that the actual diet recommended, while not scientifically correct, would almost certainly be harmless to most persons and might, in some instances, by the simple laws of chance, actually help quite a number of them. Any radical change in diet, especially if it involves eating somewhat unfamiliar foods and somewhat less than the usual quantity eaten, is quite likely to produce at least a temporary sense of well-being. To pay as much as \$25 for such diet advice as this is rather silly, however, unless your passion for mysticism is positively incurable. Of course, in the long run, the corruption of science with cheap mysticism would lead to results as disastrous as has the corruption of good mysticism with cheap pseudo-science—a thing about which I

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intend to gesticulate in the next chapter. In the meantime I must not loiter here any longer.

For I have a Sulphur Type and a nice plump Hydrogen girl waiting to go to lunch with me, and I must part company with you here. If you will write me, enclosing a self-addressed stamped envelope, I'll be glad to let you know how I made out. I have some hopes built on the Sulphur Type, if I can just get the right amount of blackberries into her, take her out into the fresh air, and explain my proposition before her mood changes. She has owed me the same eight dollars long enough now. I intend to insist that she pay it back and have the loan of another eight in its stead.

CHAPTER IV

WE SHALL REAP IF WE FAINT NOT

MY notion is, and I hope that you will agree with me—in fact, if you do not agree with me at least occasionally, it is going to make the writing of this book a rather formidable task, and I entered upon it as a pleasure—my notion is, then, that the admixture of metaphysics with science is somewhat unfortunate. The mixture has diverting possibilities, to be sure, but it is too apt to be utilized for no higher purpose than that of creating in the minds of laymen beliefs which will, as an unearned increment of mysticism, increase the dividends of those who profit largely upon the credulity of the I'll-believe-it fraternity. I fancy it is better to keep mysticism and metaphysics separate from science. To balance this conclusion I had recently an opportunity to observe what happens when you attempt to mix rationalism and false science with metaphysics.

For it rained on a certain recent Sunday and I remained at home doing nothing but devilling about with some copiously large Sunday papers. My auntie was there. Years ago when I was small she used to read the *Sabbath Reading* to me all Sunday afternoon in the effort to win my soul. She is now nearly seventy, and I shall not say how

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old I am, but she still thinks I have not made the religious progress I should have made by the time I turned forty. Doubtless she thinks this with some provocation. At any rate the architecture of my soul has, to her simple Methodist mind, certain obvious deficiencies, and in order to add a flying buttress or so, she trotted off to her room and came back with a copy of the *Christian Herald* which she thrust at me with some diffidence. I took it gingerly. I had not seen a copy of this righteous journal for many, many years. I kept feigning sleep and dropping it on the floor; she kept picking it up and thrusting it into my hands. Finally, in some desperation, I began to leaf through it and what I found therein really amazed me. For not only had the old fundamentalist metaphysics been entirely remodeled, the editorials sprang from altogether new ferments, and the advertising propounded some perfectly astonishing beliefs—some of them most seductive to my weak character.

It occurs to me, and I may be altogether wrong, that modern discussions of religion have quite generally overlooked one rather obvious method of research in the evaluation of religious beliefs. While there has been much discussion of the relations between religion and science, and religion and business, it has been of a rather abstract, formal nature. Why not, instead, consider a popular religious magazine on the assumption that its editorial policy, coupled with the character of its advertising, will reflect rather clearly not only the mental drive of its editors but also a cross-section of the mentality of its readers? Since

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the magazine is popular and widely read this assumption seems not unduly perverse.

The Christian Herald has recently become a monthly. Although it has gone through certain periods of financial perplexity it is today, and long has been, a popular religious magazine as representative, I dare say, of the average mind of the average religious person as is the *Saturday Evening Post* of the average mind of the average American. In the purely dispassionate endeavor to discover what sort of minds the pious readers of such a popular religious magazine have, I therefore spent part of this Sabbath morning in the devotional task of examining the March, 1931, issue. The stories, being rather innocuous second-rate fiction of no particular character, and the articles that were largely devoted to "success" tales of certain religious leaders, may be disregarded as irrelevant. With these deleted the following is what I found:

There first appeared an advertising page on which two young children prayed at their mother's knee to be delivered from the ravages of *Staphylococcus aureus*, *Streptococcus*, *Bacillus influenzae*, and *Micrococcus catarrhalis*. The picture of devotional felicity was very touching. But in the text on the same page the Lambert Pharmacal Company advised the children rather to gargle every two hours with Listerine for deliverance than to trust to metaphysical protection. This was said to reduce the germs on the surface of the mouth by 98 per cent, which if true is, as we saw earlier, unimportant, as the mouth almost immediately becomes germ-laden again after such a germicidal

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holocaust. The advertisement also said that Listerine "kills 200,000,000 germs in fifteen seconds," which, as we also saw, it well may do, not stating what kind of germs, and permitting the possibility that a bathtub full of the liquid could be used to kill the germs. In general the action of all such mouth antiseptics, quickly diluted as they are with saliva and as quickly counteracted and forgotten by the natural processes of the oral cavity, are little more than mild, pleasant-flavored, clean-tasting superfluities.

Knowing as I did that "Listerine is a proprietary name for a solution of well known substances which has little bacteriologic merit. . . . On dilution with four parts of water, Listerine shows no bacteriologic action, according to reports here made. . . . Listerine, diluted, as it is apt to be used, is practically worthless bacteriologically, while many other antiseptics are available that will stand dilution and remain powerfully active"; I viewed this advertising with some honest doubt. Yet, in this as in most other cases, the things that I cannot believe others can believe. Indeed any two persons can usually manage to take the very same objective facts and from them, with a little subjective refinement and polishing, construct beliefs that are as unlike as those of Bishop Mencken and Bishop Manning. A fact, indeed, standing naked and unadorned, amounts to very little. Clothe it with your prejudices, your biases, and your preconceived notions—and science has these as well as religion, mark you—and it may become a vision of radiant beauty, its knobby

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joints now concealed beneath long skirts and its scrawny torso swathed in episcopal robes. In humility I pass on.

The next advertisement informed the reader "Corkoustic says, 'Come and worship undisturbed,' " and it implied that Corkoustic would enable the members of the congregation to concentrate their attention upon the services, something they were quite unlikely to do under ordinary non-Corkoustical circumstances. A white naphtha soap was then advertised; it was made by the same company which but a very few years ago was shown by the Federal Trade Commission to sell a soap, so named, which contained a negligible amount of naphtha.

The lead article, which I noticed for its heretical character, was by "Eddie" Guest and was entitled "That Man Jesus." The second word of the title indicates theological obfuscation on the part of a periodical devoted to Trinitarian doctrines. The high point of the article was reached where Guest told of a Detroit "harlot" who, upon being arrested and requested to serve as a guest of the State for thirty days, first asked a two-day suspension of sentence to get a home for her dog and its puppies. At the end of the two days she returned and faithfully served the thirty. This proved that she was really just about the finest type of human being that lives. To say the least these doctrines would have been considered highly subversive twenty years ago by the devout members of the Baptist and Methodist churches I myself then frequented.

Charles M. Sheldon, I discovered, was still living on the reputation of his 40-year old book, *In His Steps*, of

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which 20,000,000 copies were sold, a box informed me. He was doing a new series of articles now. In these Christ had actually arrived in person to advise the President. He also advised an Editor. We are likewise told that the wealth of the newspaper owner is usually "acquired in questionable ways, measured by the Christian standard." This remark should be remembered in connection with something else I found later.

Seth Parker, now a successful entertainer who packs his crowds in at \$3 a seat and who can draw 5,000 people easily, appeared to have a department now. Stanley High had an editorial department in addition to contributing editorials to the editorial page proper. Herein he commented on the Wickersham Report. It may interest the gentry to know that he had discovered that the President was drier than his commission but he insisted that "Prohibition is not a political problem." He had also found out, in some mysterious manner denied to the less godly, the fact that the commission "stood strongly against repeal." A certain recession from extreme desiccation was evidenced, however, by his remark that too much crime was still connected with prohibition enforcement one way or another, and a new philosophic doctrine appeared when he declared the law can only succeed if there is a change in the hearts of the people, because it cannot be enforced by a policeman's billy.

Doctor High had likewise discovered that, while payrolls fell off during the first half of last year by \$815,000,000 over the corresponding period in 1929, in the

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first half of 1930 dividend payments actually increased by \$350,000,000. He remarked that eighty-two bread lines in New York City were serving 85,000 meals daily and then made the astounding remark, which should be most disturbing to the Hon. Hamilton Fish, that "It is out of the discovery of such facts that revolutions are born." The magazine had better look to its second-class mailing rights. Fortunately it is not formally an organ of the "left" or consequences might be serious.

Dan Poling on the editorial page proper found that President Hoover was at least definitely "dry," and also that the Wickersham Report spelled a great opportunity for the drys who must now go forth and fight to win. Almost immediately thereafter I came upon a full-page advertisement of the Brunswick-Balke-Collender Company which, in years past, manufactured and sold saloon equipment—a perfectly legitimate and reputable business of course, but one which, according to *Christian Herald* standards of today would quite as certainly imply that the profits it produced were made by "questionable" means. These past profits in part enable the company today to advise *Christian Herald* readers in a full page that churches should install billiard rooms and bowling alleys in order to secure bigger congregations and more money. For "billiards pay for themselves, finance themselves, become a steady source of regular income that reduces mortgages and defrays upkeep costs and overhead." In short, the modern church is actually to invest

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in pool tables which, in my church-going days, were denounced to me as engines of hell and decoys of the devil.

Forbes also had a full-page advertisement. Therein a page of the *Bible* was reproduced with this sentence of *Galatians* vi:9 circled conspicuously: "We shall reap if we faint not." The advertisement remarked that *Forbes* as well as the *Bible* will stimulate business men to action and, "Issue by issue, year in and year out, both the letter and the spirit of the message, 'we shall reap if we faint not,' are restated in a thousand different ways," thus proving that one business journal is at least as good as *Galatians*. Nearby the Postal Life Insurance asked, "Will you live too long or die too soon?"—to my simple mind a singularly inept query to be addressed to people whose lives are directly in the hands of Almighty Providence.

Then I found Pepsodent declaring that it was especially evolved to remove the film from teeth, it having been developed for this specific purpose. A long and careful piece of scientific research carried on some years ago and easily accessible, disposed of this claim altogether and demonstrated that Pepsodent was an ordinary cleansing dental cream about like any other cream of reasonably good quality. The advertisement also declared that, in removing the film, Pepsodent (which was shown to have no especial ability to dissolve mucin plaques forming the film) removed also "the millions of acid-producing bacteria that destroy the tooth's delicate enamel." About the effect of acid-producing organisms in the production

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of dental decay science is still in perplexity; the question is unsettled. It is, however, well known that even the momentary reduction of these organisms in number, or their momentary counteraction by an alkaline dental cream, can have no permanent, essential value. Lastly a publication of the American Child Health Association informs us that "There is absolutely no relation between either stain or tartar and the development of caries," and that though the cleaning of teeth has "æsthetic or educational" value its removal of the stains or films does not decrease decay.

Somewhat to my surprise I also read that "Kotex protects health and gives new peace-of-mind." So spoke one immodest lady to another in the picture reproduced. I read that this product is hygienic and deodorizing though scientific evidence to show that it contained no effective deodorizing or antiseptic agent was published by a leading medical journal months ago. My mind reverted to the days when, in common with other rural youth, I pored over Lydia Pinkham's booklets to acquire knowledge that is given directly to youth of today by the religious journals on their library tables.

Advertisements of seed merchants abounded, yet the *New Testament* assures us a seed cannot bring forth fruit unless first it die, and science insists that a dead seed is rarely, if ever, reproductive. Perhaps the theological dilemma here evident might be blown away by the \$5 bugle also highly recommended.

The American Tract Society advertised a life income

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paying up to 9 per cent. The New York Bible Society pictured two hands, one holding the *Bible* and the other a check, and said: "These bonds aid Bible distribution; pay you as high as 9 per cent." The Board of Foreign Missions of the Presbyterian Church said, "Let your gift to foreign missions pay you a life income," and also promised 4½ to 9 per cent to "Christian givers." The American Bible Society occupied an entire page headed "Happy Christian Givers." Their photographs were shown and they did smile blandly. They also declared that a "gift to God's kingdom" is a "convenient investment" for it offers a "safe income for life" at a "liberal rate promptly paid." The reader was requested to send in for a booklet entitled "Bibles and Bonds" and telling how as high as 9 per cent is paid. These financial complexities rather elude my impecunious mind though they appear to mark some sort of existing treaty between the forces of God and Mammon which certainly did not exist in my earlier days. I turn rather to an advertisement telling that communion services have been reduced, something that I can understand, or to the fact that a certain safety razor offers jobs to "conservative, reliable men and women."

Next I saw advertised a startling lecture on "Christian Psychology," which solves the vital problems of ministers, lawyers, and others, and is "the first logical, scientific, successful solution of the burning desire of every man and woman, of whatever religious belief or *disbelief* (italics in the original. T. S. H.) for the power to direct his

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or her own fate on this earth.” Aside from the fact that such works seldom deal in the same principles esteemed by the science of psychology I noted the additional consideration that such matters were wrestled out with God in earlier days, and to suggest that a Christian should read a book rather than pray for help would then have been sacrilege.

“You Will Get the Effect of a Paris Gown if You Use ——— Patterns” I read and tried to visualize the good Christian ladies of twenty years ago if confronted by such advertising in a Sunday magazine. I was also told that agents can make \$10 to \$15 a day selling a delicately scented tablet which vaporizes and becomes deadly to moths. The U. S. Food and Drug Administration not long ago visited a blanket and scientifically merited condemnation upon all such products for they do not even annoy, much less kill moths. I read that children’s coughs and colds, not to mention bronchial troubles, croup and asthma, may be relieved by using a proprietary substance in a vaporizer. The same government agency mentioned above not long since advised the public that it was dangerous to utilize such temporizing means in cases of child illness and compelled such products to appear with curative and remedial claims deleted from their labels, the government being as yet unable to control magazine advertising beyond stating the facts in public and assuming that ethical advertising managers will be guided thereby.

A certain Paul von Boeckmann appeared in the nude

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torso costume made famous by MacFadden and recommended a new way to overcome nervousness. Aspirin, which in many countries can only be had by laymen on prescription and is distinctly not a perfectly harmless drug, was recommended as safe for lumbago and for use to deaden all sorts of pains and aches. You could learn to hear by using hearing devices. Your foot pains could all be stopped without arch supporters. You could rub something on your chest to remedy bronchitis, croup, and whooping cough—a type of therapeutic claim denounced as unwarranted by government specialists. You could “tone up” on a malt and iron tonic which appeared in a 12 per cent solution of ethyl alcohol, in case you were “run down.” You could correct your spinal deformities by appliances fitted by mail—a most dangerous procedure since the careful attention of the best medical specialists is needed here to avoid life-long invalidism. You could get the hair off your lips, face, and chin by a simple painless method; science knows nothing of such methods, of course.

Somewhat more striking was an advertisement of tablets to be taken internally for diabetes mellitus. These were said to constitute a new German therapeutic method and it was asserted the tablets could be used successfully to replace insulin injections. The advertisement ended with the assertion, “This is a duplicate of the announcement that appeared in the official organ of the College of Pharmacy of Columbia University.” Investigation disclosed that the advertisement actually had appeared in

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the *Messenger*, later the *New York State Journal of Pharmacy*, but the editor insisted it was purely a paid advertisement and the company was most unethical to quote it as if it were an endorsement. Of course, added the editor, the tablets had had "a brief 'write-up' among our 'News from the Trade' " as well.

It might be as well to quote the advertisement as exactly as possible merely to show the extent to which religious diabetics could be deluded by it into the path of therapeutic iniquity. It read:

Insuloid Tablets
The Newest German Therapy for
Diabetes Mellitus
Successfully Substituted
for Injected Insulin
Prepared after a revised formula
of Dr. Heinrich Klebs of Germany
Obtainable only from
The Insurol Company
of America
Incorporated
991 Broad Street, Bridgeport, Conn.
Dept. 109

This is a duplicate of the announcement that appeared in the official organ of the College of Pharmacy of Columbia University.

The point simply is that medical science to this day knows no tablet preparation that can successfully replace insulin injections for the treatment of diabetes mellitus. There are forms of insulin for oral administration, but

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they remain in a laboratory, not a clinical, stage of investigation. There is also, in old German folk medicine, a custom of treating diabetics with tablets impregnated with the juices of the huckleberry or blueberry leaf; such treatment will depress urine sugar but not blood sugar, and is not equivalent to insulin treatment also because it has no retarding effect on the formation of acetone and acid bodies leading to coma. Insulin itself, if taken orally, is digested out of existence before it reaches any part of the organism where it can act therapeutically. These facts are well known to physicians. Both the *Christian Herald* and the journal of pharmacy involved had ready access to competent medical advice regarding such advertising. That the pharmaceutical journal was exercised only over a violation of business ethics and not at all over a more important antecedent violation of scientific ethics is most significant of this profit age.

On May 27, 1931, the United States Food and Drug Administration issued a press release warning the public against the use of worthless diabetic nostrums, and announcing Government seizure of a German product called "Insurol." Chemical and pharmacological examination of this material disclosed that it contained no ingredient or combination of ingredients capable of replacing insulin in the treatment of diabetes. It violated its own label claims by consisting only of some claylike material, yeast, reducing sugar, and some dried glandular substance. This is the wonderful new German therapeutic product the *Christian Herald* was willing, in its advertising, to

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recommend to the attention of its suffering readers. Can it be possible that in its zeal to save lives for mansions in the sky it has become indifferent to the preservation of life here below? I dwell with this fraud a bit because its sale could have such dire consequences.

I say "fraud" designedly because a postal fraud order was issued against the stuff on June 10, 1931. Insurol was a keratin-coated tablet which did not contain boldo, jambul, myrtillin, bean pod tea, or lithium benzoate as claimed on the container, but did contain some impotent animal tissue that might once have been pancreas. Insoloid was an uncoated tablet containing boldo, jambul, myrtillin, bean pod tea, and lithium benzoate, but no insulin nor pancreatic substance. When the Insurol Company felt the net drawing close about it, it addressed a pathetic but somewhat frantic appeal to its "friends." This letter is perhaps worth quoting in full, if only as a literary exhibit——

Dear Friend: You will probably never hear from us again. Please read this letter carefully: INSOLOID TABLETS have met with so much success that we have reason to believe jealousy has been aroused in other concerns, offering so-called "cures," "remedies," etc., for diabetes. At any rate, complaints, that we believe have come from envious competitors, have been made to the Post Office Department. From all we can see, at the present time, there is little doubt that the Post Office Department will exercise *the monstrous, oppressive power* it possesses to put us out of business. There is no rhyme or reason to it, but we have not enough money to make the necessary legal fight. Others have fought successfully, but we

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lack the means. Therefore, if you feel that INSOLOID TABLETS have helped you, this is *YOUR LAST CHANCE* to secure an advance supply. We do not expect to be in business much, if any, after April 30th. So, in closing out the business, at a loss of many thousands of dollars, to us, we are making a selected list of our customers a *final offer* of *four* standard packages of INSOLOID TABLETS for only \$9. On the same basis, you may have *eight* standard packages for \$18; twelve standard packages for \$27, etc., at the same rate. We can truthfully and confidently state that this remarkable offer will NEVER be repeated. It is—FAREWELL! You must act quickly, because the Post Office Department may compel us to return money received on or after April 30th, 1931. *ACT NOW*, and secure a substantial advance supply! You are going to benefit by our misfortune. We have given you a straightforward description of our circumstances, and this offer is the result. We are being unjustly and unfairly treated, but, lacking the large amount of money required to put up a fight, we cannot help ourselves. GRASP THIS SPLENDID—for you—OPPORTUNITY! It will never come again! With all good wishes for your future health and prosperity, we remain, Cordially yours, THE INSUROL CO. OF AMERICA, Inc., H. C. Young, President.

In the fraud action it was shown that the tablets would not cure diabetes nor could they be substituted safely for insulin injections. Taking two or even four of the tablets after each meal would not enable a diabetic to resume a normal diet, as claimed; would not relieve diabetes, would not keep the blood sugar normal, and would not prevent acidosis, gangrene, or other diabetic symptoms.

Fortunately for the good Christian afflicted who read this pernicious advertising, the company making the nos-

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trum belied its own advertising statements in the instructions it sent victims with the product. Though assured in general advertising that they could get along without rigorous dieting they found, after purchasing the "cure," a warning therein to guard the diet. Indeed, if directions were followed, the victim went on as rigorous a diet as ever. Finally, the preparation contained several diuretics which, by increasing the quantity of urine secreted daily, easily delude the careless patient into the idea that his total sugar excretion has diminished. I should say that whether it is too much to expect a religious journal to be reasonably up-to-date on scientific therapy or not, there is no excuse for a journal of pharmacy to act as did the *Messenger*.

The *Christian Herald* advertising ethics are apparently derived from a good old Chicago custom, evidenced by flamboyant advertising of "Eksip," another fraudulent diabetic cure, in the *Chicago Herald and Examiner* of March 8, 1931, ten days after the government had declared Eksip a fraud and debarred it from the mails. In case anyone is interested, Eksip was a tablet composed of magnesium carbonate, talc, and starch and was worthless. However, it is difficult to see why a concern with an intake of nearly \$100,000 a year, splitting its profits with newspapers and magazines to the extent of \$20,000 expended annually for advertising, should worry about so trifling a matter as the therapeutic uselessness of its product.

Before I leave the subject and return to the *Christian*

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Herald I must notice a bit of mail advertising sent me recently by a physician. It emanated from a pharmaceutical manufacturer who advertises his "ethical" products in the best medical journals. It concerned an endocrine compound, a special enteric coated capsule, for diabetes mellitus. It gave a "case report" of a "woman showing 8 per cent sugar, vision impaired, rheumatic pain in knee"; but after four weeks on these remarkable capsules her eyesight cleared, her pain left her, and she became practically sugar free. The physician who sent me this sent it to illustrate the sort of objectional nostrums that constantly besiege the physician to use them, and remarked that all too many doctors actually weakened before such onslaughts.

Returning now to the *Christian Herald*, at the top of a double-breasted advertising column I read: *The Six Miracles of Calvary*,—which proved to be a volume of addresses of an inspirational character. Below that I found recommended a chewing gum, a medicated tape to cure callouses, a cure for stammering, a method to kill hair roots and prevent the regrowth of the hair, shuffle board games "to solve social problems" (they used to pray and sing together to do that in my earlier days) and an arch brace to remove all foot pains. From the standpoint of scientific (not religious) truth practically all of this advertising is most objectionable. I also found this exceedingly curious and sociologically significant advertisement:

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GIRLS IN TROUBLE—Beulah Home and Maternity Hospital, located at 2144 North Clark Street, Chicago, Ill., is the oldest Protestant Christian Home of its kind in the U. S. They care for women, babies, and little betrayed girls.

It is difficult for me in my untutored and devastatingly chaste forties to apprehend whether this is a promise of comfort to, or an insidious instigation to evil-doing among, the younger generation. Secular exegesis would undoubtedly be profane anyway. If I might venture a suggestion it would be that the little "betrayed girls" give serious consideration to the book on miracles.

Finally there is the "Question Box" conducted by a Dr. Price who endeavors to steer his interrogators around the pitfalls of sin. One reader confessed that he had let sin get such a grip on him that he lived "in constant fear something awful will happen" to him, a throwback to the idealogy of magic. Doctor Price suggested that the brother write him personally and confide that he may help find a way around the difficulty. The next questioner wanted *Matthew* xvi:28 explained to him; he was given two contradictory explanations and left to take his choice. A third questioner desired the Biblical particulars about Armageddon and was referred to *Revelation* xvi:16. The fourth offered a more serious and complicated problem.

He is a minister himself and he wanted to know whether one of the three men entertained by Abraham in *Genesis* xviii was or was not the Lord. It seems rather late to hope to find out about this but Doctor Price averred it

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was the Son. He also gratuitously added the information that the Second Person of the Trinity was the Pillar of Cloud and of Fire that guided the Jews in the wilderness. Then he continued that Abraham's third visitor was God, "under whatever Person you may think." He did not appear as God, "though He spoke with authority." True, *Exodus xxxiii:20* does say that no man hath seen God, but that obviously refers exclusively to "God's Glorious Presence, rather than to a form in which He may see fit, by way of accommodation, to manifest Himself to Moses or to us." Moreover, if the reverend brother is really sincere in his desire to be puzzled, *Isaiah vi:5* offers him a much more formidable problem, however, for "in that case there is also a glorious manifestation and not His August Presence." Indeed, concluded Dr. Price, it is exceedingly difficult to tell what the words "No man hath seen the Lord at any time" really do mean and the pastor will have to do the best he can with this information to go on.

A lady came next who requested the location of a Biblical verse which Doctor Price could not find, having either mislaid it himself or else placed it in another book. Another inquisitive lady remarked that *James ii:10* reads, "For whosoever shall keep the whole law, and yet stumble in one point, he is become guilty of all." This seems plain enough and it worried her because, since she felt she was bound to stumble, she could not possibly see how she would escape blame for breaking all the Law. Doctor Price advised her, however, to look at the matter in an-

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other way. "God calls for perfect obedience and no one can render it. All sin in thought, word, and deed." But Jesus came to earth and He kept the Law perfectly. As He was our representative we not only share our sins with Him, but "His righteousness is given to us." We may hope to escape damnation if we but take credit for His perfect record.

Finally, another distressed lady desired to know whether it was sinful to marry if you had a living husband or wife. Doctor Price had not sufficient facts to go on here. He thought a personal letter would be better. If the divorce were given on scriptural grounds, of course, and the questioner is "innocent," then contracting a new marriage would not be sinful. But other circumstances might intervene and negate this thrust into jurisprudence. This about concluded the issue in question except for a great deal of advertising that was either ethical, or was at least not of a character to excite comment by appearing in this sacred place. It seems better to remark here that the year is 1931 in which this magazine appeared. A few comments by way of summary seem justifiable in the objective effort to arrive at some picture of the American Christian mind as we find it revealed to us here.

What can be concluded from this survey? What does it reveal as to the nature of what we may call the average Christian mind—always viewing the matter objectively? What metamorphosis has Christian belief undergone? Apparently the efficacy of prayer, or the metaphysical means of accomplishing purposes, has been all but dis-

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carded in favor of the efficacy of material and physical means. Fundamental theological and moral concepts are doubted or openly rejected while certain invitations to sin actually appear. The understanding between religious and business interests is remarkably thorough, the harmony being all but unison. Easily ascertainable scientific truths are flouted and disregarded in favor of superstitious, magical, traditional, or merely commercially synthesized and pecuniarily profitable beliefs contrary to fact. Worldliness has become religiously modish and the ethics of the Gentile have invaded the sanctuary. But some feeble minds are still puzzled, and some sincere individuals still torture themselves with purely metaphysical doubts about problems that are essentially unreal, in the sense that they express no tangible, factually based ideas.

Having said this I confess that I begin to feel something like old Mons. Geoffrin. About this elderly gentleman I know only one thing, but that is enough to indicate that we are kindred. For Saint-Beuve tells us that old Mons. Geoffrin read the formidable double-columned French *Encyclopedie* straight across the page for many years and finally remarked that he found it very learned, but rather abstruse. Viewed objectively and from the standpoint of pure science, I should be inclined to say that the mass mind revealed by what has gone before is little more than a mess. It is inaccurate, unethical, inconsistent, illogical, and very largely irrational. While essentially unscientific, if not really pre-scientific or ata-

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vistic, it is also rather seduced and governed by magic and by commercial incantations than by religion; by profits rather than by abstract justice and verifiable facts. Does this mark the gradual disintegration and imminent total annihilation of an ancient faith and the rise of new forms of unreason still more objectionable in character? Ready and anxious as I am to believe, I find myself unable to tell what to believe in this instance. Perhaps we better pass on and begin to interrogate science upon certain matters of common "knowledge," matters about which ninety-nine laymen out of a hundred have very substantial and decided opinions and beliefs. Could these beliefs be sustained scientifically? Let us see.

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CHAPTER V

A JUG OF ACIDOPHILUS—AND THOU!

I AM still numbered among those who ride in street cars. I like to sit and read in them, and ruin my eyes. I have been ruining my eyes that way for years without discernible progression in sight deterioration, too. Occasionally, to give my eyes rest, stimulus, and a pleasing change of diet, I read the car cards. This morning there flashed upon me from above an admonition something like this—

Insure Sound, Healthy Teeth and Gums! Science prescribes two 8-ounce glasses daily of fresh orange juice with the juice of half a lemon in each. Sunkist Oranges.

In short, I was being admonished to join the joyful ignorant again and to believe. Ah, but I was acquainted with science, and I knew science prescribed no such thing as two 8-ounce doses of orange juice daily in order to keep sound, healthy teeth and gums. While orange juice contains vitamin C and vitamin C has some little to do with tooth and gum health, there are many other cheaper food sources of the former and many other factors involved in achieving the latter besides vitamin C. If one must have vitamin C one may find it very cheaply in

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tomatoes, in cabbage, in peas, and even in spinach. Indeed you may find considerable quantities in the lowly potato, if Junior strikes you down when you say spinach to him.

Furthermore, I have seen Dr. Morris Fishbein, genial and effervescent editor of the *Journal of the American Medical Association*, quoted as remarking that "Orange juice is simply a pleasant drink rich in vitamin C. It is not a cure for acidosis of any severity nor will it prevent quite certainly either falling hair or falling teeth." Doctor Fishbein will have his little joke. This statement of his may perhaps be accepted as explaining why his own *Journal* has long carried the flamboyant advertisements of the citrus fruit growers with exactly the claims he denounces here, and offering also a diet book of questionable accuracy which advises the public to wallow in orange juice and thus cure its acidosis. In short, even the best scientists frequently confuse me when I want to wring the dilution out of a belief. Doctor Fishbein, with his bewildering habit of saying one thing and countenancing another in his *Journal*, habitually perplexed me, until I found that facts bothered him very little, which enabled me to discard him as an authority.

With this introduction, illustrating as it does the difficulty we meet when we try to formulate sound beliefs, I should like to tell you about the major acidophilus milk episode of my life. For I once more discovered by experience that if you will insist upon getting the scientific low-down on a problem you are likely to become hopelessly

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bogged and diabolically skeptical for your pains. I found senility approaching with measured tread and therefore, in the usual American way, decided to "take something" to ward off the mortician. By happy chance my choice fell upon an acidophilus preparation. As a matter of fact I caught a specialist friend of mine in New York in the very act of drinking a cocktail composed entirely of what he assured me was a powerful culture of *Bacillus acidophilus* in orange juice. He also said that the taste was superb. That was professional hyperbole for I soon found the taste was abominable.

However, he hastily diagnosed me to be suffering from the same complaint that cursed him, although he was sixty if he was a day, the old scoundrel, and insisted that I begin lubricating my alimentary canal with acidophilus. After a good taste I balked on the orange but compromised on the pineapple culture and went home rejoicing with a dozen bottles en route to me. After taking several with no perceptible results—at least I seemed to age a day every twenty-four hours as previously—I visited my friend, the research bacteriologist, and my troubles began. For he laughed at me.

In sending me my pineapple-acidophilus the manufacturer had waxed generous and included a dozen bottles of *Bacillus bulgaricus* culture in the bargain, and also in pineapple juice. I remembered something I had heard or seen some years ago and decided not to touch this but my wife, trusting soul, began to imbibe it and to utter all sorts of enthusiastic nonsense about the results of her

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imbibition. First my bacteriologist laughed at that. For "the bulgaricus racket" was "the bunk," no more no less. As for the acidophilus, read up and see. While one could populate a reasonably tractable colon, if one drank a quart of acidophilus milk daily containing 200,000,000 viable organisms to the cubic centimeter, fruit cultures contained very few organisms and my gesture in swilling the pineapple cocktails was worse than homeopathic. It was idiotic. So I set my dozen, less four, bottles aside to investigate.

First I pored over the book on transforming the intestinal flora that Leo F. Rettger and Harry A. Cheplin published from Yale University Press in 1921, and everything appeared very simple indeed. All previous work was unreliable, the bulgaricus organism was frequently mistaken for the acidophilus organism, much work had been performed with too few precautions—especially on the important point of differentiating between the two organisms, Metchnikoff's work was especially honeycombed with fallacies and, while bulgaricus could not, acidophilus easily could be established in the lower intestine of the rat and of humans. On page 105 I read, "The ingestion of very large numbers of *Bacillus bulgaricus* brought about no apparent change in the intestinal flora." On page 179 I learned that practically all *Lactobacillus acidophilus* preparations then on the market were worthless.

Next I turned to Kopeloff's treatise on *Lactobacillus acidophilus* and read (pgs. 30-31) "Summarizing the con-

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tributions from Yale University (mainly the work of Rettger) to our knowledge of *L. acidophilus* and *L. bulgaricus*, there is no question but that they represent the most important body of information in the field. Comprehensive experiments with animals and man led early to the conviction that *L. bulgaricus* could not be implanted in the intestinal tract and that *L. acidophilus* could become so acclimatized." On page 38 Kopeloff summarized the results of his own study by saying "*L. bulgaricus* can rarely, if ever, be implanted in the human intestine. In only one instance out of twelve were *L. bulgaricus* organisms recovered in the feces after two weeks of feeding in large quantity."

From both books I learned that preparations of both organisms in tablet form were worthless, and the same went for chocolate-covered candies. Whereas 1,000 cubic centimeters daily of a good acidophilus milk containing 200,000,000 viable organisms per cubic centimeter would give a human an ample dosage for therapeutic purposes, he would have diligently and relentlessly to eat 1,000,000,000 tablets, or 20 tons thereof daily, to attain the same end—a process that seems almost, if not quite, beyond the endurance of the most rabid health fanatic. On the other hand there were commercial milk and fruit cultures of acidophilus then extant which the victim would have to imbibe to the extent of 7 or 8 gallons daily to get his quota of viable organisms.

At this point I felt somewhat elated. The way seemed clear. The research bacteriologist was right and my New

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York specialist was obviously playing with something about as scientific as the operations of a chiropractor or an Eddy practitioner. I could even find other references to confirm my new opinion and prevailed on my wife to stop using bulgaricus. Kopeloff's book was dated 1926. In 1927 Lawrence H. James published the results of his examination of 107 bulgarian and acidophilus preparations, liquid and solid, then on the market. Of these, 13 actually contained the species of organism they claimed to contain on the label, in reasonably pure form, and of satisfactory number. Of the other preparations 15 were sufficiently pure and contained viable organisms in such numbers as to get the benefit of the doubt and be declared of possible value. The remaining preparations were impotent and worthless. James isolated 33 strains of the acidophilus organisms from his samples of which 19 appeared to be the real thing and 14 something else again; the figures for bulgaricus were 10 authentic to 5 spurious. I felt further encouraged—as we always do when the opinion we want to hold appears to be sustained by incontrovertible evidence.

Moreover Kopeloff had continued his work. In 1928 he examined 8 commercial products of which only 5 specified the number of viable organisms contained per cubic centimeter. Of these, 3 actually fulfilled their label claims. Three more contained *Bacillus acidophilus* predominantly—or at least organisms identical apparently with Kopeloff's stock organisms. Only a single preparation contained viable organisms identical with those in

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Kopeloff's stock culture and in the number specified on the labels. These products were all purchased anonymously on the open market. Kopeloff suggested that preparations contain a minimum number of organisms at the time of manufacture, and bear an expiration date beyond which they be withdrawn from the market if unsold. He concluded that as yet the quality of the acidophilus preparations on the market was most imperfectly stabilized.

In 1930 Kopeloff published a study which showed that the intestinal flora of young adults could be changed over to *Bacillus acidophilus* by the ingestion of 100 grams (a little over 3 ounces) of milk sugar daily. Perhaps certain manufacturers who put out so-called bulgaricus and acidophilus organism tablets which contained nothing whatever but milk sugar vaguely thought a tablet a day might effect such a transformation in the human intestine! This hint led me back to Metchnikoff and his Bulgarian centenarians anyway.

Metchnikoff assumed, apparently, that Bulgaria contained so many old men because they drank sour milk swarming with *Bacillus bulgaricus*. In the first place Bulgaria is a relatively primitive country where population and birth statistics are probably more than ordinarily inaccurate. Experts like Raymond Pearl hold that such countries probably do not produce centenarians in undue amount. Secondly, if drinking sour milk produced better health and longevity how does that prove that *Bacillus bulgaricus* was involved? It might have been

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the milk itself, or the milk sugar in the milk, or even something else in the diet or manner of living.

We have just seen that dosage with milk sugar alone can transform the intestinal flora and make acidophilus predominate there. Finally, it seems quite well proven that the organism Metchinkoff found was really acidophilus rather than bulgaricus anyway and that the latter cannot be implanted in the lower intestine. Yet in 1928 United States Food and Drug Administration *Notice of Judgment* 16,388 was issued concerning liquid and tablet bulgaricus preparations prepared by Parke, Davis and Co. because the former contained less than 1,000 viable organisms per cubic centimeter and the latter absolutely none whatever. Yet how about the following paragraph from the *Notice of Judgment*?

Misbranding was alleged for the reason that the statements, as follows, borne on the labeling, regarding the curative and therapeutic effects of the said articles were false and fraudulent, since they contained no ingredients or combinations of ingredients capable of producing the effects claimed: (Liquid culture Bacillis Bulgaricus, circular) "The unusual longevity of the peasants of Bulgaria is quite generally known, and is attributed to the fact that these people depend upon a sour curdled milk as a major part of their diet. This sour milk so generally consumed by them goes by the name of Kissélo-mléko * * * Investigation into the nature of Kissélo-mléko and the reason for its purported effect on the length of human life have revealed the presence of three predominating microorganisms * * * Of the three organisms isolated, one, Bacillus Bulgaricus, is considered of the greatest value in correcting intestinal disorders caused by the presence of objectionable putrefactive organisms

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in the intestine. This beneficial action * * * By exact determination of the intestinal flora before and after taking *Bacillus Bulgaricus*, it has been demonstrated, in a limited number of cases, that the predominance of the fermentative organisms over the putrefactive organisms is almost complete in three to four days after the first dose has been digested * * * To obtain the maximum effect"; (tablets *Bacillus Bulgaricus*, carton and bottle label) "Enteritis, infectious diarrhea, infantile diarrhea, and other gastro-intestinal affections of bacterial origin."

In 1927 *Notice of Judgment* 15,423 was issued against the H. K. Mulford Co. on its Acid-O-Phil Tablets which were devoid of acidophilus but which, on their label, recited the whole rigmarole of acidophilus therapy regarding high protein diets, putrefactive germs, intestinal decay, and the necessity for the oral administration of acidophilus cultures, in tablet form, containing authentic strains of the beneficial organism. In fact, as the enforcement official I had now besieged waxed to his subject he had me all out in goose pimples. *Notice of Judgment* 16,023 in 1928 was issued against Parke, Davis Butter-milk Tablets which were a sterile and inactive product recommended to produce soured milk. Sherman's acidophilus tablets got *Notice of Judgment* 16,354 in 1928 because they did not contain acidophilus in amounts sufficient to have therapeutic value. Mulford's Pure Living Culture of Bulgarian *Bacillus* got *Notice of Judgment* 16,542 in 1928 because its purity fell below the professed standard of 50,000,000 organisms per cubic centimeter claimed on the label, and "examination of a sample of the article by this department showed that it contained no

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Bacillus bulgaricus." *Notice of Judgment* 16,075—and many other such notices—concerned the bulgaricus and acidophilus preparations of Fairchild Bros. & Foster, because they fell below the standard content of viable organisms in 1928. And so on, for I stop simply because the repetition would become a monotonous bore; further *Notices of Judgment* abound.

At this point it is difficult for me to say what restrained me from throwing the remainder of my fruit juice bulgaricus and acidophilus preparations into the trash. However, I retained them until I had time to interview another man, also an enforcement official, but a combination bacteriologist and physician whose participation in legal cases had given him wide opportunities to see all sides of this question. After talking with him the story comes out something like this:

Preparations of either *Bacillus bulgaricus* or *Bacillus acidophilus* in tablet form are quite uniformly worthless and have been pretty well banished from interstate trade. Even if they leave the manufacturer containing some viable organisms they seldom reach the consumer other than in a state of disgusting impotence. There can be and are prepared cultures in jelly form, covered with chocolate, which not only contain potent, viable organisms, but contain them in such number that the ingestion of two such candies daily will supply as many organisms as will a quart of good acidophilus milk. Finally, there are on the market today many milk preparations containing approximately the required 200,000,000 viable

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organisms per cubic centimeter, but there are also both bulgaricus and acidophilus preparations in fruit juices which are almost as strong per cubic centimeter as the milk cultures. The fact remains, however, that whereas the patient drinks a quart of the milk daily, he or she is usually advised to drink but $\frac{1}{2}$ pint at most of the fruit cultures.

No standard content of viable organisms has been established by government officials for the very good reason that too many physicians are willing to go into court and swear that they get positive clinical results with fruit juice or other preparations containing as few as 5,000 to 10,000 organisms per cubic centimeter. An effort is made, however, to have manufacturers prepare cultures considerably stronger than this minimum.

Another fact must also be remembered. There is such a thing as pride of pronouncement among scientists. Thus when Goldberger first showed definitely that pellagra was a nutritional and not an infectious disease, physicians who had made pronouncements favoring the infection theory met him with jeers and insisted they were right. In similar manner there are scientists who can be regarded as acidophilus-milkmen. They have gone on record that milk cultures are alone of value and you must, therefore, take anything they say about chocolate jellies or fruit cultures with a grain of salt. Moreover, there are scientists in university and other laboratories who regularly act as consultants to manufacturers who produce commercial milk cultures of acidophilus, just as scientists accept

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fees for consultation in other lines. Such a pecuniary situation in our profit economy almost invariably has some effect upon the impartiality and scientific judgment of the scientists in question.

All of these things must be considered when we face the problem of the therapeutic utility of bulgaricus and acidophilus milks. Getting back to bulgaricus for a moment—so completely has the theory been exploded that these organisms are at all useful in changing the intestinal flora that it is positively heretical today to publish an article claiming clinical value for such cultures. I doubt that you could get such an article published in any “respectable” medical journal. Yet there are physicians ready to go into court at any time and swear they have repeatedly gotten excellent clinical results with bulgaricus cultures containing comparatively few viable organisms. So what can an enforcement official do? He would go to court and present his expert testimony; the bulgaricus culture manufacturer would present opposing experts whose testimony sounded quite as authentic; the judge would conclude they were all liars and throw the case out of court.

Another possibility is also to be considered. If by drinking some three or four quarts of a good milk culture of *Bacillus bulgaricus* daily you keep a constant procession of the organisms en route through the alimentary tract it is possible you may get some good therapeutic results. It is almost certain that you will be able to recover bulgaricus from the feces. On the other hand apparently conscientious experts have apparently recovered

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what looked to be *bulgaricus* organisms and have sincerely thought they were *acidophilus*, so much do the organisms resemble each other. Then there is the close resemblance between the X and Y strains of the *acidophilus* organism itself to consider, and the actual fact that bacteriologists themselves still argue hotly in their meetings over these gradations by which one organism tends so closely to resemble another as to be mistaken for it. We must face the fact that the methods of differentiating various strains of *acidophilus* from each other, and strains of *bulgaricus* from *acidophilus* still leave much to be desired.

Lastly, there is a point brought up by another specialist friend of mine, an internationally respected expert on the intestinal tube. He writes me that his results with the very best milk cultures of *acidophilus* are equivocal, and he scarcely knows whether he is going or coming. He works in one of the finest clinics in America and has every facility to study the question scientifically. Before he went to this clinic, the Mayo, he also tested *acidophilus* out thoroughly with an excellent culture prepared by an expert bacteriologist at the University of California Hospital. He is Dr. Walter C. Alvarez.

He tells me: 1. That there are probably very few intestinal floras that need to be changed in any case; 2. that it is the devil's own job to change then; 3. that it is just as hard a job to keep them permanently changed; and 4. that he has never seen any good come of treatment with *acidophilus* milks wherever he used them. He cites the

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particularly bad practice once quite common and still occurring occasionally of a patient proudly taking a culture some friend had brought directly from Europe, transmitting it herself (it is usually "her") from one unsterilized bottle of milk to another. What possible mess of impure bugs she had after a few transmissions it would defy the best bacteriologist to say.

One may, if one wishes, fall back upon the refuge of personal idiosyncrasy, the only apparent shelter in the present state of our knowledge about the therapeutic value of *bulgaricus* and *acidophilus* milks. One may assume it possible that certain patients are not affected even by superior cultures of either organism, and that many are benignly affected by comparatively few viable organisms. One may even hold that some people for some obscure reason react favorably to *Bacillus bulgaricus* preparations. I see no reason why one should necessarily make such assumptions, as they are merely elaborated in a spirit of empirical or *ex post facto* obstinacy. But there is so little solid ground here that this fiction can perhaps not be denied those who will have some sort of explanation.

So you see,—like the chap who sat under a tree with a loaf of bread, a jug of wine, and his neighbor's wife—in seeking knowledge I came out about whereat in I went, and what I have in my hand looks very much like a small bottle of pineapple juice containing some viable *acidophilus* bacteria. I arrived home just in time to find my wife taking the last of her *bulgaricus* and asking for more.

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There is at least this to be said: When the street car cards and the *Journal of the American Medical Association* join forces and bark at me to imbibe orange juice and cure all my ills, I remain in a vile state of suspicion that in both cases the prospect of revenue from advertising predominates over scientific ethics. I may consider it well established that many other foods will do for me what orange juice will, and more cheaply, and that I require no specific dosage with orange juice to keep my teeth amused. On the other hand, facts are still being ascertained about soured milks. It is not possible at this time to do other than to maintain a state of suspended judgment and see what we shall see. Certainly grandiose claims for the therapeutic value of such milks should be viewed with errant skepticism; just as certainly we cannot yet say that science has definitely demonstrated that drinking the preparations is a harmless, though expensive, amusement. Personally, I should prefer to use something else about which I could get definite and reliable information. But you may do as you please. You usually do, don't you?

REFERENCES

Journal of the American Medical Association, July 9, 1927, pg. 89,—
Lawrence H. James.

Ibid, October 20, 1928, pg. 1192—Nicholas Kopeloff.

Ibid, June 21, 1930, pg. 1983—Nicholas Kopeloff.

The exaggerated claims for the health value of the juice of oranges, and the offer of the diet book, were freely distributed through the pages of the *Journal of the American Medical Association* during recent years—say from 1928 on, so freely that the following statement attributed to the same *Journal* in its sacred text becomes ludicrous in the extreme—

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"Wherever we turn our retinas are scorched by the vitamin claims of some bread, milk, or 'sunkissed' orange. . . . The air is filled with radio messages in song and verse, extolling the special health-giving virtues of one food or another, *ad nauseum*." Nothing is so revolting as our own pet sin—when committed by another. Under the raucous editorship of Dr. Morris Fishbein, both this *Journal* and *Hygeia* have been as guilty as any other publications of fostering "health-giving-virtue" advertising, but almost undoubtedly such advertising pays. Why, therefore, fool to make it accurate?

CREEDS

CHAPTER VI

LOOK NOT UPON THE WINE

IT has by now become evident to us, I believe, that an isolated fact, naked and unadorned, is about the most impotent and meaningless thing in the world. For, quite like a myth, a fact must be imbedded in the matrix of a creed to acquire dignity, and to persuade us to invest our belief in it. There are, therefore, many creeds, not all of them religious. Religious creeds are in some rare instances in part based upon facts; they will also bend both myths and facts to their own purposes. Secular creeds are more often based upon facts than are religious creeds, but they will also use myths with great impartiality, and do not hesitate for a moment to distort facts for their purposes in turn.

Moreover the context of a fact or myth, and the condition of the prospective believer, are both of fundamental importance. When the Latter Day Saint I mentioned earlier threw open his private window of Heaven and momentarily let me gaze forth upon strange sights, the context of his myth was perfect and, for the moment that he enthralled my fancy, he captured my belief. He was obviously sincere, the chapel in which he had me was impressive, the entire atmosphere of the surroundings

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was conducive to belief. Had he told me what he had to say in a downtown hotel lobby, or on a street car, I should not for a single instant have given credence.

When I was young there was in my family a very powerful creedal belief to the effect that alcohol was exceedingly injurious to the inebriate. The common assumption was that cirrhosis of the liver was most likely to occur as a sequel to fervent and industrious drinking. Since that time medical science has almost completely exploded this myth. I knew a man not long ago who had imbibed alcoholic liquors with very considerable assiduity and perhaps too little discretion as to their quality. But he knew the facts considered established by modern medicine and felt positive his liver was all right. That is he did while he was well. But he fell ill. He then quickly became positive that he had ruined his liver by much drinking, and nothing but the reassurance of a medical examination at a clinic proved sufficiently powerful to disabuse his mind of this potent childhood myth which, he told me, was an article of faith in his family as well as in mine.

This brings me to Charles R. Stockard's *Physical Basis of Personality* which I have just been reading. Doctor Stockard, who is a professor of anatomy, was, as we shall see later, the scientist who exposed various generations of rats to the fumes of ethyl alcohol, and who showed that their prenatal mortality became higher than was usual, although the postnatal mortality of the rats actually born to mothers exposed to the fumes was lower than usual.

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By the time this work was done the creed about alcoholic imbibition had become a notorious and an astounding thing. In fact there were two directly antagonistic creeds held with religious fervor—one to the effect that alcohol in the slightest quantities was definitely injurious to human beings, the other to the effect that moderate or even somewhat expansive drinking was not injurious. Advocates of both creeds stood ready to pounce upon the impersonally ascertained facts of science and to mutilate them sufficiently for their own creedal purposes.

Consequently a fanatical religious group usually called the “Drys” loudly asserted that Doctor Stockard had proved that alcohol was injurious to human beings. The equally fanatical religious group usually called the “Wets” replied by declaring that the fumes of alcohol obviously simply weeded out inferior individuals while they were still eggs, the prenatal mortality being greater, and therefore built up the race by producing animals of superior strength and resistance. Both sides very carefully ignored the fact that Doctor Stockard had simply experimented on rats and had not bothered about human beings at all. Finally, on pages 162-163 of his above-mentioned book, Doctor Stockard himself says this—which impresses me as quite important:

In view of the present state of agitation and misinformation over the virtues and vices of alcohol, let me hasten to add that the above effects are not at all due to any specific action on the part of this substance. In fact many other chemical substances in daily use, such as sugar or common table salt, if excessively

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administered to animals will induce results closely the same as those above described. This statement is fully justified by many experiments on the effects of various common substances on the eggs and embryos of many animal forms. No one is at present able to designate a given abnormality in an animal specimen as the specific reaction to the experimental administration of one chemical substance. It may be added further, as Pearl has called attention to from our experiments, and has clearly pointed out from experiments which he conducted with the fowl, that in all these experiments the alcohol is highly beneficial as a selective agent tending to eliminate weak and defective individuals from the stock. It also may be noted that this elimination of defective individuals is performed in the gentlest manner by pushing the death moment back into the prenatal life-time, which in popular opinion is before the individual's existence has begun.

Again insisting that these experiments concern rats and fowl, not human beings, let me now turn to Prof. Yandell Henderson, Yale physiologist. Some of us, if we do not live in New York and Baltimore which cities Bishop Cannon has officially handed over to the Devil, may be aware that there was passed by Congress a few years ago what is called the Prohibition Amendment and that the Volstead Act came soon thereafter. It may also occur to us, if we stop to think about it, that these laws were designed to prevent the sale of intoxicating beverages. It is likewise to be remembered that these laws were passed after a great hue and cry by politicians and fanatics, but that the coldly impartial facts objectively ascertained by scientific physiology were conspicuous by their absence. In consequence it interested me to read in the Washington

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Daily News of October 15, 1930, this statement attributed to Doctor Henderson in the *Yale Daily News* of the day before:

No beverage which in common usage is drunk in such amounts that not more than the equivalent of 80 c.c. of absolute alcohol is absorbed into the blood in an hour, can properly be denominated as intoxicating. General experience shows that few persons care to drink 2 liters and a half ($\frac{1}{2}$ gallon) of beer in an hour. The teaching of physiology and toxicology in regard to the liquor question is that the definition of intoxicating alcoholic beverage implied in the Volstead Act excludes from use beverages which are practically nonintoxicating. The act forces most persons who desire to consume alcohol at all to make use of those beverages such as whiskey, gin, and half-diluted crude alcohol, which are highly intoxicating. The final effect of the Volstead Act is exactly the opposite of that which the 18th Amendment was intended to attain.

The impact of belief upon facts, with all its power of distortion, is so evident here that I think it wise to examine the question of whether the use of alcoholic beverages is or is not injurious to human beings. The editor of the *New York Medical Journal and Record* is evidently a man of courage and tolerance. During 1929 he offered, in an open forum, to let the doctors have a fling at "prohibition." And if you think clear guidance on this subject may be derived from the assumed dispassionately scientific statements of these discerning practitioners, reasoning from their own personal experience and observation, you are about to be shockingly disappointed. Instead, every possible attitude was adopted, and every

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common lay shade of opinion about the evils or benefits of "prohibition," the extent of alcoholic consumption, the dietetic and therapeutic value of liquor and the social evil attendant upon its abuse was closely simulated in more technical, and hence more impressive language than the layman can muster. It would be absolutely impossible to do more than summarize the letters into three or four fundamentally antipathetic propositions painting as many mutually conflicting pictures. Indeed, physicians practicing in identically the same locality often disagreed absolutely in their interpretation of what they saw there. This also holds for the results of a questionnaire sent out some years ago by the American Medical Association which sought to ascertain whether physicians thought that alcoholic drinks were a necessary adjunct to therapy and, if so, which ones and in what quantity? The published results represented medicine in conflict, and that was about all.

It may indeed be considered apparent that the practicing physicians of this country know, as a group, nothing about this matter that transcends the knowledge of the average intelligent layman; they are in flat contradiction with each other and their personal prejudices appear to have influenced their "impartial" observations. Sumner in his *Folkways* reminded us that not even the scientist could possibly hope to escape the *mores* in which he was reared any more than he could escape the law of gravity or the pressure of the atmosphere. The doctors amply illustrate this saying, and the more any individual ex-

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amines the subject, the more clearly he sees a reflection of what he desired to believe before he undertook the investigation.

It may not be out of place to see just what some scientists and presumed experts says on the alcoholic subject. About the latest authoritative work on human nutrition I have read is Graham Lusk's *Science of Nutrition*. Graham Lusk is elderly, very learned, very much respected, very scientific, and an authority second to none in physiology. His book, in its fourth edition, 1928, is just about as reliable as anything that has been or could be published. What does Lusk say? He says:

Taken in moderation alcoholic beverages contribute greatly to human happiness and constitute one of the solaces of mankind. Taken in excess they lead to many social evils. "Prohibition" as currently practiced in the United States is not entirely a blessing. It is not morally wrong to drink a glass of wine and therefore it is not commonly accepted as a crime to do so. (Pages 489-491.)

Writing in *Science*, April 5, 1929, Seager, Verda and Burge of the University of Illinois Department of Physiology said that they had determined the effect of ethyl alcohol, fat and protein, or the amino acids composing proteins, on the metabolism of sugar. It was found that alcohol stimulated sugar metabolism almost as much as fat and protein. It was therefore concluded that alcohol, in addition to serving as a source of heat and energy, may also serve another function of foodstuffs; namely, that of stimulating metabolism. Furthermore, I read that alcohol

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is "more easily oxidized than ordinary foodstuffs, and for this reason it is used in critical periods of sickness and in weakened conditions of the body."

All right. That is a good start and so far we may feel informed. I jump next to Sir Henry Rolleston, one of the greatest physicians in England, who remarked in *The Practitioner* of October, 1924, that alcohol is an excellent emergency and temporary remedy at the crisis in pneumonia to stimulate the heart and induce sleep. He added also that it is a food, protecting the fats and proteins. In convalescence it stimulated the appetite, aided digestion (St. Paul probably told him that in *I Timothy* 5:23), relieved worry, counteracted restlessness and thus promoted recovery. This authority, however, argued against the continuous use of alcohol in chronic diseases. Well and good. Starling, one of the greatest modern physiologists and whose work is almost biblical in its authority is, in the same issue of the same journal, markedly unfavorable to the use of alcohol. He questions its utility as a heart stimulant in severe infections and, on the whole, indicates that man can probably get along better without than with it.

We do not seem to have made much progress. But we must keep bravely on, regardless of our destination which, plus accurate observation and sound logic, is all there is to science anyway. Willcox in the *Virginia Medical Monthly* for September, 1926, remarked that absolutely nothing can replace alcohol medicinally to relieve worry, distress, and anxiety, to give a feeling of well being and

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repose, which are vital matters in the crisis of disease. The therapeutic utility of alcohol is unquestioned.

Lee in the *Journal of the American Medical Association* for August 22, 1925, observed that alcohol has no benefit as a stimulant in infections and no demonstrable effect upon metabolism (which last flatly contradicts the work of reliable physiological investigators). On the other hand alcohol is beneficial in the production of "euphoria," and the genial doctor added: "There seems to be some evidence that in occasional cases the administration of alcohol to the state of mild but observable intoxication may be beneficial." It has been plausibly argued by Mencken that Americans should all be compelled to remain partially intoxicated at all times in order to make life in this serenely obnoxious republic tolerable to them. Perhaps this is precisely the salubrious state of gentle "euphoria" Doctor Lee has in mind.

Hopping over to Germany I next find Leddig definitely stating that digestion is greatly improved by the use of alcohol, especially if the stomach be too low or too high in acid. Fortunately other investigators hasten to tell me that the higher concentrations of alcohol precipitate the stomach pepsin and render normal digestion impossible. We must not make up our minds too quickly. Thus fortified we may be sufficiently strong now to undergo an economic argument from Scotland.

The British correspondent of the *Journal of the American Medical Association* (June 6, 1925) declared, from Edinburgh, that forty years ago an average of

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\$10.75 was spent per patient for alcoholic drinks used therapeutically; in 1924 this per capita charge had been reduced to 10 cents without obvious increase in the death rate—except among the doctors themselves who, according to a more recent article in an English periodical, tend to die much more frequently from acute alcoholism in recent years. The Edinburgh correspondent continued that in 1900 each patient admitted to a London hospital had administered to him an average of nineteen tablespoonfuls of brandy while there, whereas the 1924 figure was three tablespoonfuls. Just to make it unanimous the writer insisted that this decline in the therapeutic use of alcohol has been worldwide.

The London letter of the same *Journal* for November 23, 1929, commented on the general decrease in drunkenness in the empire during 1928. The total convictions for this "crime" were 55,642, a low figure only attained before in 1917 and 1918 when many men were in France and the home consumption of liquor was drastically curtailed. The figure for convictions in the normal year 1919 was 76,988; in 1924 the figure was 79,802. Since then there has been an annual decline, that for 1928 being 14.6 per cent. But, the letter adds, "This decline of drunkenness must be largely attributed to industrial depression and the very high cost of intoxicants since the war." That just about takes the wind out of that zeppelin.

According to statistics of the Bureau of Prohibition in the Treasury Department (*Lancet*, May 4, 1929, pg.

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943) of 116,756 licensed American physicians tabulated, 48,097 prescribed alcohol during 1927 and 68,951 in 1928. Nine million prescriptions were written in the United States in 1922, 13,500,000 in 1926, and 12,000,000 in 1927 for some form of alcoholic drink. In short alcohol seems quite considerably used therapeutically in this country if it is going out of fashion in Great Britain.

Returning to experts we may call Stiles of Harvard. In his *Nutritional Physiology* he tells us that when Professor Atwater long ago produced scientific evidence to show that alcohol was a food, virulent associations of fanatical total abstainers and individual temperance advocates at once had at him heartily in a manner that would have discouraged a more timid scientist. Instead Atwater came back impudently to persist that facts were more important than wishful beliefs. It is plain that the subject has long been controversial. And it still is assumed more important to hold and fight for "right" opinions about it, than even to attempt to ascertain the facts and see what opinions are actually right!

Of course alcohol is a food. George H. Lewes in his *Physiology of Common Life* tells us that when a gathering of German total abstainers met years ago at Frankfort, hotel and restaurant keepers were quite unable to cope with their unusual demand for sweets and pastries. This suggested to him that they were reasonably and properly compensating for a lack of alcohol in their diet by eating carbohydrates to physiological excess

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—which is just as deadly. Stiles, to whom reference was made above, admits that alcohol is, of course, a food though he, quite unlike Lusk, regards it as a wasteful and a superfluous food. Do not forget that Stiles, like Lusk, is also an authority to be believed and respected.

We come now to Lord Dawson of Penn who gained newspaper notoriety as physician to George V in his severe illness of late 1928. Speaking in the House of Lords in 1924 he declared that Great Britain would be foolish to follow America's lead in prohibiting alcoholic drinks, because she was rapidly becoming temperate and temperance was far better than abstinence anyway. He continued that the vast majority of medical opinion favored the therapeutic and beverage use of alcohol in moderation. While it is a wasteful food and does not specifically promote physical or mental labor, it is beneficent to the nervous system, it lightens the mental horizon and brightens the outlook. We have "euphoria" back with us in a light disguise and this wise physician apparently realizes that man needs synthetic optimism to make life tolerable in the face of things which drove Schopenhauer to suicidal obsession and Nietzsche to insanity. Both philosophers would have been better men had they indulged copiously in euphoria.

However, in view of what we just learned above about pneumonia, it is now high time for us to find that Capps and Coleman (*Journal of the American Medical Association*, March 17, 1923) made an elaborate statistical study disclosing that even the moderate use of alcohol increased

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pneumonia mortality while its extensive use was very pronounced in this effect. This nonpartisan scientific statement must have set emotional prohibitionists baying for the *Journal* later ran an editorial explaining that this piece of work should not be interpreted as antagonistic to the therapeutic and beverage use of alcohol in moderate amounts. It seems just as well to set against it, however, Raymond Pearl's statistical study (1924) which covered 2,000 cases and indicated that while heavy drinkers shortened their lives seeking "euphoria," moderate drinkers actually lived longer than total abstainers by a matter of 0.99 year, whatever that is worth. We cannot pause to explain the apparent discord in this paragraph, for Pearl's study included deaths from infection. There are so many more sprightly things than prosaic explanations to entertain us.

In the *Journal* for November 12, 1927, the editor, via Raymond Pearl, answered a query from a correspondent as to the effect of alcoholism on virility. The reply, based on Stockard's work, stated that alcoholic animals tended to have fewer but more vigorous offspring because their weaker germ cells are killed off by alcoholic indulgence. However, it was added, no conclusions one way or the other can be drawn regarding human beings, which is a not unusual situation when a scientist works with rats. Oddly enough he finds out what is good or bad for rats!

This answer reflects the work of Stockard published in *The American Journal of Medical Science* in 1924 which defended alcohol as an agency tending to eliminate race

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degeneracy. Stockard recorded observations on several generations of—rats. Severe alcoholism did not impair health or shorten the life of the first generation, which is interesting when we reflect that rat nutrition does quite closely simulate human nutrition. Weaker animals were eliminated from the second generation before birth, however, as the weaker germ cells were killed within the animals. Survivors, in later generations, rapidly became more and more vigorous till they far surpassed the control stock and there was finally developed a group of rats, very superior in vigor, all by the simple process of eliminating weak germ cells through alcoholic indulgence.

Stockard went even further. He contended that the dominant human races have always been heavy users of synthetic optimism and alcoholic euphoria. He remembered also that alcohol was more freely used a few years ago when we had fewer degenerates and unfit misfits to coddle along with philanthropy. His argument essentially was—drink up and improve the race! There was a time when this doctrine might have been regarded as inhumane. Fortunately such decadence no longer plagues us under prohibition when kind Christian ladies and ardent suppressed gentlemen espouse the cause of poison liquor on the ground that those who drink it should be encouraged to do so in order to eliminate them and their kind from our moral American stock.

In a book published about 1919 Abraham Jacobi was impolite enough to say that prohibitionists are impeded by their ignorance and that the whole truth about the

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physiological and social effects of alcoholic deglutition were unknown. We do not even know that much yet. We are sure that the excessive use of alcohol often brings social evils in train, but all the evidence we have would certainly tend to encourage, or at least not to inhibit, its moderate use.

Lord D'Aberon suggested a fundamental thought in his book in 1918—i.e. that the drinker has a sense of well being and is fully convinced that he is better off, though to the cold, impartial observer he is not really more efficient and clever than in his normal state of human misery. Thus Miles (*Proceedings National Academy of Science*, 1924) gave typists and other clerical workers 21 to 42 grams of alcohol in solutions of various strengths and got for his pains a complete picture of impaired efficiency. The greater the amount of alcohol consumed or the strength of its concentration in the drink, the greater the inefficiency. Even in sacred 2.75 per cent alcohol acted inhibitive! The habitual use of alcohol as an aid to work therefore seems rather certainly to be a mistake.

But while Miles says that alcohol makes us inefficient and Zeiner of Oslo avers that, even in non-intoxicating quantities, it decreases the ability to distinguish colors—what about euphoria? Life is very hard for most people. A man drinks and feels better; then he is better, though he be shortening his life. He feels that he can solve problems, accomplish tasks and think great thoughts more easily than in his sober state. He escapes frustration. He is comfortable, confident, composed and

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unafraid. If he wants to be a great poet—drunk, he is a great poet. Is that nothing? William James and James H. Leuba found precisely the same effects induced by various other drugs. The subject was positive that he had solved the great mystery of existence. He could not explain it at all when he returned to normal, nor were his thoughts, if recorded, other than the veriest common-places; but while the power worked in him he KNEW.

Leuba went further than that. He found precisely the same, identical euphoria or ecstasy of omnipotence, transcendent knowledge, and sense of accomplishment in religious mystics. The psychological picture was quite indistinguishable from drug intoxication. Witty and Lehman, writing in the January, 1929, *Psychological Review* on "Religious Leadership and Stability," discuss Luther, Bunyan, Tolstoi, Fox, St. Augustine, Huss, Wesley and Mohammed as notable examples of unstable or pathological psychic types who sought and found solace, compensation and stabilization in religion.

To be scientific I should conclude something from this study. What can be concluded? Little except that the advisability or the inadvisability of the moderate use of alcoholic beverages is an open question with such slight evidence as we have preponderating in the direction of a decision to use it in moderation. The question ceases to be one of abuse or abstinence, but one of sane, moderate use. Rolleston tells us that the ancient Roman who took his liquor straight or became debauched was regarded as a boor and a pig. His very wines were carefully diluted

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with snow and he was an exponent of moderation. What better can we do than imitate the Romans?

My personal attitude toward prohibition should have no weight. I happen to be one of those unfortunates who find the mere taste of alcoholic beverages insupportable; furthermore it has not half the authority over me of strong coffee. Before prohibition I seldom had to make refusals, for few offered the guest liquor then, and if I did my refusal met no rebuff. Today I am offered liquor everywhere and on every occasion and my refusal to take and enjoy what another thinks is good and has gone to considerable trouble to secure invariably creates a mild feeling of displeasure, if nothing more formidable. But I rise heroically above this nasty little prejudice and say let drink who will.

A tremendously interesting and informative study is that by David I. Macht entitled "A Pharmacological Appreciation of References to Alcohol in the Hebrew Bible," which appeared in *The Scientific Monthly* for August, 1929. Macht concludes that:

Alcoholic beverages in moderation are, strictly physiologically speaking, of some value as *foods*, and the Old Testament affords abundant proof of their having been regarded as much by the ancient Hebrews. Wine and alcohol, from the standpoint of modern pharmacology, are of unquestionable value as a *medicament* in a series of clinical and pathological conditions, the most important of which are shock, cardiac failure, insomnia, nervous exhaustion and mental depression. The beneficial effects of wine and strong drink, when taken in moderation for each and every one of these conditions, are unequivocally at-

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tested in the Hebrew text. If the modern pharmacologist and practicing physician would include under its medicinal applications the employment of alcohol *pharmaceutically*, as for the extraction and preparation of drugs, for which purpose it has always been indispensable from remote antiquity to the present time, we should fully agree with the epigrammatic dictum of the Talmud, which apostrophizes as follows: I, alcohol, am at the head of all medicaments.—*Baba Bathra* 58, b.

The Bible also warns against the dangers of excessive abuse of alcoholic beverages, but, as Professor Abel has said, "The molecule of C_2H_5OH is not distinguished from molecules or other drugs or therapeutic agents by a distinctive and peculiar poison label." All drugs are poisons and can be dangerous, and how a given drug will act under various conditions depends upon many variable circumstances. Ethyl alcohol is exceptional in its low toxicity because the body can burn it so readily and utilize it nutritionally. Macht and his coworkers

have further demonstrated, in a comparative study of alcohol, caffeine and nicotine, administered in minute doses, comparable to the amounts of these substances taken by human beings in their everyday beverages and in moderate smoking of tobacco, that of the three chemical substances of drugs thus ingested or absorbed the *nicotine was by far the most poisonous*. Next in order came caffeine, and *alcohol was the least harmful*. Such scientific data in regard to alcohol are strikingly in accord with the accounts of its action on man described repeatedly in the universally revered and fascinating literary text before us.

We are in the presence of another of those numerous questions which the long, patient and unflurried method

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of scientific observation and deduction can alone settle. Though these questions are all considered settled by most people—and emotional solutions do exist in prolific abundance—they are not yet settled by far, scientifically speaking. There is abundant evidence, but it conflicts. Much more must be accomplished physiologically, chemically, economically, and socially before we can begin to conclude anything at all. Meantime suspended judgment and moderation are the only justifiable attitudes. Over-indulgence in order to assert the doctrine of personal liberty is as unscientific as a morbid, though theoretical, total abstinence tainted with all sorts of political corruption and civic indecency, not to mention skullduggery and outright crime. But, as James informed us, he who can preserve *sui composes* in the face of emotionally agitating questions is rare and I regret to confess that I know of no certain immediate remedy for this unfortunate situation.

Before passing to a consideration of several other interesting secular creeds it may not be out of place to conclude by quoting some Bible verses:

Therefore God give thee of the dew of heaven, and the fatness of the earth, and plenty of corn and wine (tiros).—*Genesis* xxvii: 28.

Yea, the Lord will answer and say unto His people, Behold, I will send you corn, and wine (tiros), and oil, and ye shall be satisfied therewith.—*Joel* ii: 19.

Go thy way, eat thy bread with joy, and drink thy wine

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(yayin) with a merry heart; for God now accepteth thy works.
—*Ecclesiastes ix:7.*

And the vine said unto them, Should I leave my *wine, which cheereth God and man*,* and go to be promoted over the trees?
—*Judges ix:8-13.*

Thus saith the Lord, As the new wine is found in the cluster, and one saith, *Destroy it not; for a blessing is in it*: so will I do for my servants' sakes, that I may not destroy them all.—*Isaiah lxxv:8.*

* Italics mine, not the original Author's. My thanks to the *American Druggist* for permission to reprint portions of this chapter which originally appeared therein.

CHAPTER VII

COFFEE IS MIGHTY BAD FOR YOU

AS I toyed with my second cup of breakfast coffee in a restaurant this morning a sinister and desiccated gentleman who sat across the table from me looked at me severely and remarked, "Coffee is mighty bad for you." He was wallowing at the time in some sort of infusion made from baked grits or dried banana peelings, a coffee substitute guaranteed, I understand, to be free from the "harmful" substances in Postum! He looked as if something had been mighty bad for him. I gave a high, fluttery laugh, grabbed my paper and ran from the place before I began to believe him. Already I was weakening before a creedal statement that had had considerable potency over me in the days of my youth.

On the way to my office I caught up with an elderly gentleman I knew well and told him of the incident. To my surprise he said, "Yes, I guess coffee is pretty bad for you. Twenty years ago when I turned fifty Ma decided it was time for me to ring down the curtain on the Java. I had put away six or eight cups a day up to then, but from fifty on she said I better preserve my health. So she quit making coffee. We don't serve it in our house at all any

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more.” He paused then, as anticoffee fanatics have a habit of doing, in order to let me survey the magnitude of his salubrity. He did look robust and I began to have a slight palpitation at the thought of the poison I had imbibed.

But he spoke again—“Of course I let mother have her way. All I do now is start for the office a little early and get my two cups of coffee as I go; I have two more at lunch and pick up the other two on my way home to dinner. I’ve done that twenty years now. So we are both satisfied. Each is willing to sacrifice something for the other. Ma makes her coffee after I leave and drinks it. My son caught her at it and told me. That’s the way to be happy in marriage; no friction about anything.”

I felt somewhat encouraged. “I will live,” said I. But I wondered if coffee was bad for me and determined to find out. In the seventeenth century there appeared in England a book containing a poem entitled *A Broadside Against Coffee*. Perhaps a stanza thereof would fit well about here—

Confusion huddles all into one scene,
Like Noah’s ark, the clean and the unclean,
For now, alas! the drench has credit got,
And he’s no gentleman who drinks it not.

I am willing to assume, for purposes of argument, that “the drench” was coffee. The earliest coffee houses were opened in Constantinople and Venice; the first one was established in England in 1650. The Constantinopolitan

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coffee houses were long regarded by myopic rulers as nests of sedition (the phrase of Charles II, of England, was "Seminaries of Sedition"); they became centers of political disturbance, and patrons were known to beat each other over the head with the furniture when coffee-infuriated. At one time Muhammedan priests were quite certain that coffee-drinking was offensive to the Prophet himself. But things settled down to the civilized point where the wife's refusal to make coffee for her husband became justifiable grounds for divorce. The habit of coffee toping spread with marked rapidity in England, and coffee houses soon became the meeting places of convivial groups and British political agitators. Indeed Charles II sought to suppress the coffee houses, while wives piteously complained that "on a domestic message a husband would stop by the way to drink a couple of cups of coffee," and edge further on to physiological damnation.

Frederick the Great, who was naïve enough to believe what the doctors said, thought that the drinking of coffee caused sterility. Irritated also to learn that a very considerable quantity of money left the country via foreign coffee merchants, he tried to restrict the use of the stimulant and to impose a heavy license on a favored few dispensers. Indeed he insisted that his subjects give up this new drink and go back to "healthful" beer on which he had been brought up, and upon which many battles had been won. He did not believe that "coffee-drinking soldiers could be depended upon to endure hardship or to

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beat his enemies in case of the occurrence of another war."

In those days coffee was indeed harmful. The English Doctor Pecoche declared that "Some drink it with milk, but it is an error and such may bring in danger of the leprosy." Dr. J. G. Millingen (*Curiosities of Medical Experiences*, 1837) was willing to go further than that and in a different direction. According to him the drinking of coffee caused "feverish heat" and various nervous disturbances, yet was to be recommended in moderation to relieve headache, asthma, digestive disorders, and opium poisoning. The moral benefits of coffee drinking he felt to be considerable. The beverage had the admirable advantage, he asserted, of affording stimulus without producing intoxication, and thus made an ideal contribution to the progress of civilization. Indeed he was sure that tea drinking had contributed more to the sobriety of the Chinese than the severest laws, the most eloquent discourses, and the best treatises on morality. Finally, Francis Bacon is quoted as holding that coffee "comforteth the heart, and helpeth digestion." I could ask no more than that.

Well, to be candid I could ask more. I ask a modern scientist and W. H. Gantt (*Journal of Laboratory and Clinical Medicine*, 14 917, July, 1929) blandly informs me that bread and coffee mixed will sometimes produce a slightly greater secretion of gastric juices for an hour or so, but that the intensity of this effect depends upon the

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individual and is most variable. Or, in this modern day, I can sidestep coffee and use a "substitute." Not long ago I could have used "Grains of Health" which was advertised as preventive of headache, gastritis, indigestion, constipation, and weak or lost appetite, and as "Better than Coffee." Indeed this advertising told me that it was a "Heathified Coffee" that "does not produce harmful effects." Analysis by the Food and Drug Administration disclosed that it was composed of coffee, chickory, and some starchy material and that it contained 0.45 per cent caffeine. Since this is about the quantity some straight coffee contains *Notice of Judgment* 16,259 condemned the claims of "Grains of Health" as false and fraudulent.

To be impressive about it I should say that

Coffee (*Coffea*) consists of the dried seed of *Coffea Arabica*, *Rubiaceae*. The constituents of the green bean are caffeine, fat, caffeic and chlorogenic acid, saccharose, etc. . . . In the process of roasting a small amount of caffeine is volatilized; but since about 10 per cent of water is driven off, the percentage of caffeine is actually a trifle higher. The main change in roasting consists in the production of aromatic, brown and oily products. This oil (*Caffeol*, or *Caffeon*), according to Erdmann, 1902, and Grafe, 1912, consists of 50 per cent of furofural alcohol, and small quantities of valeric acid, phenol, pyridine, and a nitrogenous aromatic substance. It is probably derived mainly from the hemicellulose. The beverage, coffee, is a decoction made with 6 to 10 per cent of the drug. Practically the entire caffeine (perhaps 9/10) is thus extracted; so that a cup of strong coffee, prepared from 15 to 17 Gm., contains about 0.1 to 0.12 Gm. of the alkaloid.

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I could unreele a great deal more of that. I think I owe intelligent readers a little of it anyway, for prestige purposes. I am getting it from the Third Edition of Torwald Sollmann's *Manual of Pharmacology* (pg. 282). I could stop and explain that saccharose is simply common table sugar, that phenol is carbolic acid, and that I have no idea what on earth chlorogenic acid is. But I find it much better to let a rich deposit of verbal ore stand thus in the original matrix when I come upon it; it gives an erudite air of abstruse scholarship to an otherwise too flippant discussion. If it seemed more suitable I could digress botanically and remark that "Coffee is the product of a rubiaceous plant indigenous to Abyssinia. . . ." but that doesn't seem to be getting us anywhere, except to a dictionary, so why bother with it?

More important is Sollmann's admission that coffee drinking increases mental and physical efficiency, psychological stimulation, and comfort, and provides relief from mental and muscular fatigue. The stimulant does not harm "if the consumption is kept within bounds," which seems reasonably vague and should serve most impractical purposes. Finally, I read, "The bad effects are usually not very serious, and disappear promptly if the habit is discontinued. They consist in nervousness, tremor, palpitation, insomnia, headaches, and digestive disturbances." Sollmann also holds that coffee oils can cause nervous dyspepsia. While tea tends to constipate coffee is laxative. Both interfere somewhat with digestion—coffee because of its oils and tea because of its tannin.

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The caffeine, through its vaso-dilator action, may add to the difficulty.

An editorial in the *Journal of the American Medical Association* (97 1391, Nov. 7, 1931), after commenting on the lack of scientific information upon the subject of coffee drinking and declaring that physicians either repeat "traditional admonitions," or disregard them, discussed the recent experiments of Helen Hackett which seemed to show that "the drinking of coffee over a long period of years has a tendency to raise slightly the basal metabolism of normal young women." The experimental evidence was, however, equivocal. The *Washington Herald*, May 26, 1930, reported work of Norman W. Lyon of the psychology department of Columbia University, which tended to show that decaffeinated coffee could stimulate student subjects quite as regular coffee did. Leo L. Stanley and Gordon L. Teschler (*California and Western Medicine*, xxxiv 359 ff., May, 1931) studied the soundness of, and movements made during, sleep as affected by coffee; the normal average number of movements made per hour by seven male subjects were 10.42; when they drank coffee before retiring the average was 8.07; when they drank a cup of hot water it was 8.43. I shall have more to say about altered coffee and coffee substitutes a little later.

Meanwhile, getting down to aluminum pots, is coffee bad for me? Perhaps yes, for it is said "readily to form unpalatable combinations with metals and should always be kept and prepared with glass utensils." Worse still

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Macht, Bloom, and Ting (*American Journal of Physiology*, lvi 264, 1921) claim to have demonstrated in a comparative study of alcohol, caffeine, and nicotine, administered in minute doses comparable to the quantities of these substances taken daily by human beings in their everyday beverages and in moderate tobacco smoking, and "of the three chemical substances or drugs thus ingested or absorbed the nicotine was by far the most poisonous. Next in order came caffeine, and alcohol was the least harmful."

This seems encouraging only in the sense that it will be less pernicious if I break the Prohibition Law than if I drink six cups of coffee daily, which, God help me I do—but thank God the man in the next room swills one-half a gallon and takes it black. Caffeine, dissolved in distilled water and administered through the mouth to normal sized rabbits will kill them, but it takes 1 gram of the drug per 2.2 pounds of body weight to do it, and that is considerable. In fact it is equivalent to approximately 175 cups of ordinary coffee for a man weighing 155 pounds which, for some reason surely not in the mind of the investigator, I weigh. Furthermore if the caffeine be administered even to the rabbit in the form of coffee beverage the same quantity, 1 gram per 2.2 pounds body weight, does not produce uniform results. Some rabbits fold up and die promptly; others recover from the supposedly lethal dose when so administered. In short personal response and individual idiosyncrasy have stepped into the rabbit picture. Finally, small doses of caffeine

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stimulate the rabbits and render them rather more skittish than in their more sedate moments, doing them no permanent injury.

But why talk about rabbits? That is a habit I got into when I was a biological chemist. A biological chemist is a scientist who, when you ask him whether this or that is good for you, immediately begins to tell you how the substance affects rabbits, or guinea pigs, or rats, and can work himself into a most extraordinary ferment over the matter without once suspecting that what he has to say is somehow irrelevant. What can caffeine, via coffee, do to me then, to make it more difficult for my mother to recognize me as her son?

Victor C. Vaughan holds the effect of caffeine in moderate dosages is certainly beneficial to humans. E. T. Reichert says the virtues of coffee are subjective and depend entirely upon a rather baleful exhilarant action on the mental processes—"euphoria" again no doubt. C. E. Turner says coffee is not harmful in "reasonable quantities," and in so saying has, scientifically, said nothing. G. N. Stewart, a physiologist, says coffee is a more suitable stimulant for the healthy than alcohol. O. T. Osborne says civilized man is over-stimulated in this age anyway, and the less coffee the better. Harvey W. Wiley called coffee a fair friend and a dogmatic master, and C.-E. A. Winslow says that coffee is not necessarily bad just because it sometimes becomes a tyrant. You can take your choice of that and do as you please. The only definite thing I can discover is that investigators gener-

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ally agree coffee is not good for young children; regarding its effects on adults they are in diametrical disagreement and, I much fear, none of them can prove the validity of their beliefs by adducing sound facts.

For what can coffee harm? The heart and arteries? It may slow the pulse, increase the force of the heart-beat, stimulate the muscles, and inhibit the vagus—all of which sounds impressive, especially if you are not certain what it means. It seems rather certain that the drinking of coffee increases the mass movement of the blood, but there is no reliable evidence that I can find definitely demonstrating that caffeine in ordinary doses, as taken in coffee, has an insidious pathological effect on the circulatory system.

How about the kidneys? Coffee is undeniably a diuretic. Moseley observed that in 1792 and used it to treat dropsy, claiming great success. (Dropsy, it is to be remembered, is not a disease but a symptom.) Certain workers feel that by its diuretic action coffee is a valuable agency to stimulate the kidneys to increased activity; immediately thereafter others declared this was all wrong. The diuretic action of caffeine is largely determined by the size of the dosage. G. Vinci claimed to find pathological changes in the kidney tissue following heavy dosage with caffeine; A. R. Cushny declares that caffeine does not injure the kidneys even when given in large doses over a long period of time. H. B. Meyers here bobs up with his top hat full of rabbits to support this statement, insisting that healthy rabbits become accustomed

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to large doses of caffeine (50 to 90 milligrams) without suffering renal injury. The class on the kidneys is obviously not getting anywhere and may as well be dismissed.

Something has already been said herein about digestion. In so far as coffee affects digestion adversely I believe we may rather blame certain oils than caffeine itself. Indeed the best coffee is made in glass, using water just below the boiling point, say 95° C. or 190° to 195° F. Contact should be for 5 minutes and the beverage should then be served immediately. In this manner deleterious ingredients of roasted coffee are largely avoided. If necessary I could cite investigators who claim coffee favors digestion and increases peristalsis, and others who say the opposite. If cursed with a skeptical mind, however, you can find these fellows for yourself in the references at the end of this chapter. Large doses of caffeine will almost certainly upset the digestion. So will large doses of lobster, candy, dill pickles, or Italian spaghetti.

Caffeine does, however, affect not only the cerebral centers but also the sensory nerves and the spinal cord. It makes the ideas seem clear and thoughts flow more freely, while it appears to relieve fatigue and drowsiness. Cushny says, "If the quantity ingested is small the results are of distinct benefit in intellectual work," which perhaps explains my superiority on six cups daily as compared with the fellow in the next room on the half gallon. As E. H. Starling remarked it is quite possible to

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take coffee to such excess as to induce sleeplessness, irritability, and worse. Certainly the nervous should use it with discretion. I say this who have been so nervous that I pitched over into complete prostration—yet I went in and emerged with my coffee, and use it without slack to this day. However, I am seeking to give what scientists say, not my personal idiosyncrasies.

There is considerable work to show that coffee speeds up the metabolism and is an effective respiratory stimulant. W. H. R. Rivers adds that "caffeine increased the capacity for both muscular and mental work, this stimulating action persisting for a considerable time after the substance has been taken without there being any evidence, with moderate doses, of reaction leading to diminished capacity for work, the substance thus really diminishing and not merely obscuring the effects of fatigue." The British pharmacologist, the late W. E. Dixon, adds that "caffeine decidedly facilitates the performance of all forms of physical work." H. L. Hollingworth found caffeine more effective as a stimulant in the afternoon, when his subjects were beginning to show definite signs of fatigue, rather than in the morning when they were fresh from a night's rest. The action he thinks to be one which permits fatigued nerves and muscles to carry on longer than they otherwise would, for caffeine appears to be of no benefit, but perhaps rather a hindrance, to fresh athletes when performing muscular feats. By this time, you see, we have admitted that the use of coffee obscures rather than diminishes fatigue; this brings

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us into contradiction with Rivers' quotation which opened the paragraph and permits us to pass on with a free conscience.

For children coffee is generally considered bad. In old age the same dictum holds. Scientists apparently agree that the senile should have little or no coffee. On the other hand many of the aged known to me personally have used it, even in considerable quantity—six or eight cups daily—without apparent discomfort.

This brings me back to the decaffeinated coffees used by etiolated dyspeptics who plague us with their dietetic piety. Before considering them at all we must remember that caffeine is not the only possible source of digestive irritation in coffee. The oils and various other constituents may prove bad for certain individuals. However, the normal coffee contains from 1.3 to 1.8 per cent of caffeine plus 15 per cent of crude fat and tannin compounds. In 1928 there were on the market certain so-called decaffeinated coffees, or coffee from which 97 per cent of the caffeine had been removed. Incidentally, no one has so far been able to remove the caffeine from a coffee without giving it a dismal and insipid taste that proves anathema to any real coffee inebriate.

An American Medical Association was, however, moved to wrath by the improper claims of these decaffeinated coffees. Some day I must try to investigate why the Association is so often moved to wrath by relatively minor matters and so seldom fulminates against the unscientific proprietary medicines so freely prescribed, with its beni-

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son, by orthodox physicians. At any rate in this case they found that Kaffee Hag contained 0.5 per cent caffeine and Sanka 0.28 per cent. Normal coffees contain anywhere from 0.1 per cent to 7 per cent caffeine, but the average is usually around 1.5 per cent. Assuming that the coffee originally used contained 1.2 per cent caffeine the American Medical Association figured that it was highly misleading for these coffees to claim that 90 per cent, much less 97 per cent of the caffeine had been removed. When it came to Blanke's Refined Health Coffee, they found 3.98 per cent caffeine. The usual cup of coffee, the American Medical Association stated, contained from 0.1 to 0.12 gram or from 1.5 to 1.75 grains of caffeine. If Blanke's coffee were used according to the directions given (not according to the label, which optimistically claimed 60 cups could be made from one package) one would get 37 cups per package containing 1 grain or 0.065 grams of caffeine each. If Kaffee Hag were made in accordance with directions each cup would contain 0.75 to 1 grain of caffeine; the corresponding figure for Sanka would be 0.40 grain. Since the makers of these health coffees protested the American Medical Association findings the examinations were repeated; Kaffee Hag then contained 0.52 per cent and Sanka 0.32 per cent caffeine while the American Medical Association gave as sustaining evidence certain analyses made outside their laboratories.

As usual, it could not be said that the American Medical Association came into court clean-handed. Some

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years ago the University of Leiden scientist, Dr. Storn Van Leeuwen, published privately a booklet reporting studies on the nocturnal activity of one dog, weight 13.2 pounds, when dosed with caffeine, with an extract of ordinary coffee, with an extract of decaffeinated coffee, and when undosed. The dog's activities were recorded as rotations on a dial which represented the vertical displacements of its suspended cage; graphs were drawn to illustrate the work which, H. M. Johnson and T. H. Swan showed, (*Psychological Bulletin*, January, 1930, 27 26-9) simply indicated that, when dosed with coffee equivalent to eight cups of strong coffee for a man weighing 159 pounds, the dog had a few brief periods of restlessness and otherwise slept even more quietly than normally. Hence the effect of the coffee was an evening of heightened activity followed by a night of unusually quiet rest.

However, a decaffeinated coffee got out a propaganda booklet based upon Van Leeuwen's work, and apparently with his permission, wherein single recorded rotational figures were given to indicate that while the normal record was 48, the record after drinking coffee was 148, and that after drinking caffeine-free coffee only 55. The gist of the matter, of course, is that the recorded readings meant far less than the fact that the activities of the dog were often concentrated into short periods of time, when it drank coffee, and that most of the time it slept far more quietly after the coffee dosage than without it. However, February 19, 1927, (pg. 13 of the advertising section) the *Journal of the American Medical Association* carried

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an advertisement for a decaffeinated coffee which it subsequently condemned.

In this advertisement there were reproduced portions of Van Leeuwen's original charts, references to his work, carefully selected bits of his apparatus, and such captions as "Increased Restlessness Resulting from the Ingestion of Caffeine," "Normal Restlessness During the Night," and "Courtesy of Dr. Storn Van Leeuwen at the University of Leiden." However, this noble *Journal*, which becomes so passionately infuriated when the advertising of other publishers is irrational, omitted in this advertisement pictures of Van Leeuwen's entire apparatus in use, and failed signally to state that his results pertained to a 13-pound dog instead of to typical human subjects. Indeed the advertising was grossly misleading and sought to convey the impression that Van Leeuwen worked on several human subjects. So much for the fury of the American Medical Association to protect doctors and the public from misleading and socially pernicious advertising. A few years later, however, the *Journal*, as we saw, turned its critical eye upon Kaffee Hag and similar products.

What happened? The makers of Kaffee Hag claimed that the American Medical Association methods of analysis were faulty. They said that they started with a coffee containing 1.34 per cent caffeine and that Kaffee Hag contained only 0.31 per cent. Meantime Kellogg bought Kaffee Hag and began to remove from 93.8 to 97.14 per cent of the caffeine to the satisfaction of the

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American Medical Association which baptized it and began to advertise it in the *Journal*. To be sure its present 0.25 grain or less of caffeine per cup will harm few drinkers, except neurotics. In this connection it should be said that the U. S. Food and Drug Administration had repeatedly analyzed Sanka and Kaffee Hag and had never found the excess caffeine the American Medical Association claimed to find. The Connecticut Agricultural Experiment Station in 1916 reported that caffeine was almost completely eliminated from Kaffee Hag even then, and after extensive analyses in 1928 said: "Kaffee Hag is a modified coffee, the caffeine being practically eliminated." I consequently feel at liberty to believe that in this case the American Medical Association displayed more emotion than laboratory skill.

The makers of Sanka in turn also employed other chemists to confute those of the American Medical Association. They claimed that the coffee with which they started contained 1.2 per cent caffeine, that they removed from 84.9 to 94 per cent of this, and wound up with a product the decoction from which would contain only from 0.25 to 0.50 grain of caffeine per cup. They were almost undoubtedly right and the Medical Association had again gone off at half cock.

Blanke, however, was caught dead. The manufacturers made no effort to sustain their claims. Instead, they began writing letters to physicians in which they almost altogether dropped the low-caffeine propaganda to expatiate upon the fact that they removed deleterious

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tannic acid from their health coffee. Their advertising began to read "Our process of making and refining this soluble product results in caffeine reduced 90 per cent. Free tannic acid is practically eliminated." The American Medical Association suggested that the Food and Drug Administration train its artillery here. This organization had already examined many decaffeinated coffees and, with a few words on that aspect of the matter, I shall pass on feeling that I have left the subject of coffee drinking reasonably well confused.

We have so ordained things in this country that we provide about a million and a half dollars annually to a scientific organization to which we delegate the task of protecting us from fraudulent foods and drugs manufactured by the billion dollars worth. Indeed one commercial firm can expend more money annually exploiting one superfluous dentifrice on the radio than does the U. S. Food and Drug Administration in all of its work enforcing the food and drug law. Consequently, the Administration has to devise a project system and hit the worst frauds first and hardest, giving temporary sufferance to those that are less inimical. But in 1929 and under published *Notice of Judgment* 17445 it got around to the unjustifiable claims of "Blanke's Refined Health Coffee." The label claims then were that 90 per cent of the caffeine had been removed and free tannic acid was practically eliminated from the product. The coffee was recommended for the easily sleepless who from time immemorial had been told by the medical profession to

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avoid coffee. The malicious astringent action of tannic acid on the stomach, and the resultant digestive disturbances caused thereby, were described in piteous pseudo-scientific terms; the ill effects of caffeine upon the heart and the blood pressure were expounded, and the refined health coffee was recommended even for infants. Finally Blanke coffee was recommended for nervous disorders and sick headaches. These and various other health claims made by the manufacturer were declared false and fraudulent, no answer or plea was forthcoming from the Blanke Health Coffee & Tea Corporation, and the product was destroyed by the United States marshal.

I should now like to close this chapter with two unfortunate pin-pricking facts which devastatingly let most of the air out of the bubble of belief I have heretofore threatened to construct. The physiologist W. E. Dixon, in coöperation with W. H. R. Rivers, once accurately measured the work performed by healthy men on a regular regime as to sleep, exercise, and diet, when caffeine was administered to them in water an hour before the work began. The work output of each subject was obviously increased and this fact was duly recorded. Ultimately it occurred to the investigators that the ritual of taking the drug might be having a purely psychological effect upon the subjects of the experiment. They then found that they had no difficulty whatever in showing that water made bitter with a trace of quassia or any other simple bitter had precisely the same apparent power to increase work capacity as did a dose of caffeine. The

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second fact is that frequent tests have shown coffee does not stimulate experimental subjects, particularly if they think that the coffee they are drinking has had the caffeine removed from it. If, however, they think that they are drinking an infusion of unaltered coffee, the decaffeinated variety will stimulate them.

Obviously the great body of what we regard as the common knowledge (as distinct from rational science) of any age is funded out of traditional teachings, superstitions, and ancient metaphysics, as well as the personal impressions and opinions developed in us by our fragmentary partial experience. The tragic inadequacy of the result, the fact that it is full of error and illusion, is the primal source of the failure of human effort and aspiration. . . . Scientific method is a systematic effort to eliminate the poison of error from our common knowledge. If common knowledge were entirely wrong in substance and method, science could not have any base from which to start or any certain direction in which to proceed. It would be impossible for science to arise out of common experience and reflection if the latter did not contain the seeds of truth as well as the noxious weeds of error and illusion.

Suppose we part from the subject of coffee with these high words from Morris R. Cohen, thanking God as we go that Dr. Wilder D. Bancroft of Cornell announced, in April, 1931, that certain types of insanity, which he described as resulting from "coagulation," can often be helped by treatment with such a dispersing agent as caffeine found in coffee. Great is Allah and Science is his prophet!

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CHAPTER VIII

THE WICKED LURE OF COFFIN NAILS

AS we saw when we considered the modern status of *The Christian Herald*, creeds change tremendously with the passage of the years. Some of them indeed become unrecognizable. Thus recent cigaret advertising tells a vastly different story from the creed recited to me at my mother's knee. For she told me that smoking tobacco would almost certainly ruin me physically and project me into the capacious arms of the devil besides. Modern cigaret advertising, however, runs on so alluringly about the ultra-violet-ray, health-giving properties of certain tobaccos, and their ability to produce a slender figure, that the cigaret has recently become, I am moved to believe, an aid to health comparable only to the daily dozen and to roughage.

The genius who invented the slogan, "Reach for a Lucky Instead of a Sweet," made millions. This advertising was answered by the confectioners who quoted from a scientific book the statement that "fats burn in the flame of carbohydrates," and recommended candy also as a slenderizing agent. True enough, as far as science was concerned, both claimants were on treacherous ground, for neither claim could be sustained scientifically,

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but look at the profits!* More recently Lucky Strike advertising has featured various fierce-looking gentlemen in a state of almost apoplectic super-adrenalism who vociferate with a sneer "*They're Out—So They Can't Be In!*" This assertion was invariably followed by a starred footnote which informed the now breathless reader by saying, in stark simplicity, "U. S. Bureau of Animal Industry Order No. 201."

All this sounded so enigmatic to my plastic and somewhat liquid brain that I called my friend, the Chief of that Bureau in the Department of Agriculture, and gave vent to two carefully modulated "What hos!" He laughed and said that in the first place B. A. I. Order No. 201 had long since gone out of business and had been superseded by an order number in the latter three hundreds. While this marked a certain mathematical gain he continued that the order had nothing whatever to do with cigarets, but concerned the preparation of a sheep dip. It followed, logically, therefore, that the order also had nothing whatever to do with Lucky Strikes, or the more hysterical claims of their makers, in the first place. The firm had used the slogan to the limit of its financial return; they had "graciously" desisted from its use, when they were through with it, because of representations from the Department of Agriculture; and the Chief of the Bureau of Animal Industry felt gratified that sheep dip had gotten just that much free advertising. The incident now has a mere academic, museum interest as

* Cf. *Degradation of Science*, T. Swann Harding, pgs. 338-9.

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another example of the manner in which a commercial claim may be given a pseudo-scientific and quasi-governmental camouflage which, though purely fictitious, usually proves pecuniarily profitable.

However, my real objective is to examine the belief that tobacco smoking is harmful, rather than beneficial. What has science to say about that? The habit has existed for quite some time. Columbus discovered the native Cuban chiefs whiffing their Habanas, and doubtless the name of the Island of Tobago has clung to the weed. Jean Nicot, French Ambassador to King Sebastian of Portugal, introduced smoking into France, and by 1624 things had reached such a pass that Pope Urban VIII excommunicated snuff takers, while in 1690 Pope Innocent XII extended this mark of disapproval to smokers in general. On the other hand it is to be remembered that the stern Puritan fathers smoked like glue factories, while about 1840 women were smoking long, black stogies and horrendous pipes with all the nonchalance of present-day flappers, and the periodicals of the time yauped at them with vigorous caricature. Again there was a period in the early Victorian era when smoking fell into desuetude and became almost a lost art both here and in Great Britain.

In the British *Lancet* during 1925 Prof. D. T. Barry, physiologist at University College, Cork, really said about all that can be stated scientifically regarding smoking. He first affirmed that the heavy smoker regularly carries from 1 to 2 milligrams of nicotine per liter of his blood;

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hence if his tobacco is suddenly withdrawn he is almost inevitably troubled with bad symptoms and suffers impaired efficiency; these effects are almost identical with those produced by an overdosage of nicotine on a light smoker. Professor Barry had, for instance, observed a marked decline in golf form resulting from a decreased smoking allowance on the part of heavy smokers. Golfers beware! He concluded: "The physiological effects of tobacco, as our present knowledge reveals them, are not sufficiently deleterious to counterbalance the benign influence of the drug in other respects. It may be abused, of course, but so may food, and this latter form of abuse is, in my opinion, responsible for greater evils than those resulting from the abuse of tobacco." In case it affects you favorably it may be well to say that Professor Barry was both an M. D. and an F. R. C. S. at the time.

During the same year the *Journal of the American Medical Association* editorially remarked the billions of cigarets then smoked annually in this country and asked petulantly whether smoking was to become a health or a moral problem. Caution was advised, however, in the making of generalizations. It was in 1925 also that the studies of Dr. Rosslyn Earp, Director of the Medical Department of Antioch College were reported, and they should detain us momentarily because of their almost ludicrous pseudo-scientific character.

About half the students in this college smoked. Groups of equal numbers composed of smokers and of non-smokers were compared. Doctor Earp reported that only

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31.8 per cent of the nonsmokers failed to make their required grades, whereas 62.3 per cent of the smokers failed, while those who inhaled failed more consistently than smokers who did not inhale. Of 177 students who smoked 74 had gained athletic letters in other schools before they reached Antioch, but only 56 of those who did not smoke had gained them. Doctor Earp observed, however, that only 21 of each gained their letter in Antioch and joyfully concluded that the smokers rated lower in physical and mental efficiency than the nonsmokers! Belief that passeth understanding must have been required to arrive at that conclusion. Doctor Earp also observed that of the 23 students dismissed in one year for poor scholarship, 20 smoked. He finally declared that in the grand average the grades of the smokers were 0.37 less than those of the nonsmokers.

The absurdity of this study is apparent. It is a caricature of scientific research motivated throughout by belief. The basic fact that the smokers and the nonsmokers might have differed mentally and physically in the first place, and regardless of their tobacco habits, was entirely ignored. The figures given are in no case impressive and the conclusions drawn are highly imaginative. Unfortunately many people, indeed many orthodox physicians, regard such work seriously and refer to it as if it had scientific significance. Actually it classifies with belief in the Immaculate Conception or in the existence of goblins.

In 1926 Sir Humphrey Rolleston, later physician to

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King George V in his long illness, delivered himself authoritatively on the "Medical Aspects of Tobacco" in a British medical journal. He remarked that tobaccos differ greatly in their nicotine content, running from over 4 per cent to 1.4 per cent, and even lower in nicotine content. What is even more important he declared that the combustion of the tobacco is most complete when it is used in the form of cigarettes, less complete when cigars are used, and least complete in pipes. From this he concluded that the worst effects of tobacco smoking are manifested when the smoker uses a pipe, that cigars are better, and that cigarettes are the least harmful form of the weed. This revelation almost requires us to kneel in prayer at the death of a most cherished belief to the effect that cigarettes are especially dangerous. As a matter of fact, Rolleston goes on to say that cigarette paper is harmless and that whatever stinging or biting effect cigarettes produce is caused rather by their content of pyridine, furfural, and ammonia than by their nicotine content.

Cigars can have a bad effect upon human beings because of their nicotine content. The nicotine content of cigarette smoke is very low, that of pipe smoke exceptionally high. However, in any case, normal human beings easily acquire a notable tolerance to tobacco and are little harmed. In the time of the London plague it was esteemed salubrious to smoke, but it has since been shown that tobacco has little if any bactericidal effect when so used. There is some evidence of an adverse effect upon the nervous system and Earp's experiments

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seemed to show that the use of tobacco lowered mental efficiency from 10 to 23 per cent, but it is obvious that the experiments were not carefully controlled. Smoking sometimes causes palpitation in young smokers and arrhythmia is an occasional sequel in the elderly. There is no evidence, holds Rolleston, that the use of tobacco produces angina. It must always be remembered that coffee, tea, and many other things will produce extra systoles—irregularity in the heartbeat, and tobacco alone cannot be convicted in the absence of carefully controlled tests.

Earp claimed that athletes perform better if they are nonsmokers and that smoking impaired men both physically and mentally. Adolph Abrahams, on the contrary, says that the effect of tobacco is too trivial to measure, but he does think its use may raise the blood pressure. Walter C. Alvarez, however, could find no evidence at all that the use of tobacco heightened the blood pressure, a result which confirmed that of Dr. Wingate M. Johnson who also discovered no difference in the mean blood pressure of two small groups of smokers and nonsmokers. Any adverse respiratory effect of cigarets may be changed rather to their content of other compounds mentioned above than against nicotine.

In this connection it may easily be seen that carefully controlled experiments are almost impossible. If you have nonsmokers smoke in order to test them you have produced an abnormal state in them, since they have not had time to adjust to the habit. If you deprive smokers of their weed, you again produce untoward symptoms.

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If you use two groups, one of smokers and one of non-smokers, it is quite impossible to say that other differences in constitution, diet, exercise habits, sleeping, age, or other factors did not produce the effects you attribute to the use or abuse of tobacco. Even if you use the same group of subjects first when smoking and then when not smoking, their ages do not remain static, they may make slight changes in their diet or exercise habits, or they may simply be more or less fit psychologically and constitutionally at one time than at another. Finally, if you use animals you rule out those personal idiosyncrasies so characteristic of a more complex organism like a human being.

A few years ago a Dr. Charles L. Barber was widely quoted as declaring that "A baby born of a cigaret-smoking mother is sick. It is poisoned and may die within two weeks of birth. The post-mortem shows degeneration of the liver, heart, and other organs." The religious took up this bald statement of nonsense and gave it most extraordinary publicity. Yet it was based upon nothing. Standard works on gynecology and obstetrics did not sustain it, neither did the clinical experience of reputable specialists. No statistical data then available supported the statement, as birth records take no cognizance of the tobacco habits of parents. It was not known whether furfural, nicotine, carbon monoxide, or other tobacco products could get into the maternal blood stream; the tobacco smoking fathers were ignored; no one had traced the results of smoking to the placental blood supply. Had the tobacco manufacturers chosen to

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use this error in a business way I suppose we might soon have read "Not a Coffin in a Carload," or "Mothers Who Smoke Alfalfas Have Strong Children and Are Guaranteed Against Twins."

Dr. Wolff Freudenthal indeed tells us that only a few years ago physicians would seriously report that a man of 20 began to smoke heavily and that at 55 he heard poorly, wore spectacles, had a ringing in one ear, and occasionally suffered dyspepsia; all this would be presented to show that tobacco was injurious. One physician even claimed that a smoker regained his lost hair after he quit the weed. Doctor Freudenthal, as an eye, ear, nose, and throat specialist, was able to say only that excessive smoking seemed to cause some congestion of the mucosa of the nose and pharynx, and to produce chronic laryngitis in some people. He did not cite smoking as a cause of mouth cancer.

The January 1927 issue of the London *Practitioner* contained articles by three distinguished scientists on the subject of tobacco. Sir Humphry Rolleston, writing on the "Effect of Tobacco on the Digestive System," said that nicotine inhibited the movements of the stomach, thus causing a cessation of hunger sensation, that genuine tobacco dyspepsia was very rare, and that only excessive smoking ever caused gastric distress. Prof. W. E. Dixon, the physiologist, cited the fact that ammonia gas, carbon monoxide gas, pyridine, and pyridine derivatives were formed in smoking tobacco and might be more irritating physiologically than nicotine. He also adduced some

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evidence to show that students who smoked were more efficient mentally than others who did not—a gratuitous assertion probably resting upon no foundation and therefore impossible to demolish. He said that tolerance to both nicotine and carbon monoxide, in the small quantities involved, was easily established and that tobacco produces a soothing, beneficial and relatively harmless effect upon its smokers in this mad, nerve-trying modern civilization.

Sir Robert Armstrong-Jones undertook to discuss the effect of the use of tobacco upon the nerves and mental faculties. He recommended smoking in the open air as less harmful than in a closed room; he noted that smoking was today rather the rule than the exception and hence could not be degenerating the race very rapidly; he endorsed cigarets as the most preferable form of smoking. If the cigaret is used without a holder which induces the smoker to use up the badly poison-contaminated butt, the process is ideal. He thought smoking bad for the young but was keen enough to see that beliefs fashion opinions here rather than verifiable facts establishing beliefs. He concluded on this helpful note: "Speaking generally, tobacco smoking in moderation is not injurious to grown-up people; indeed, on the contrary, it exercises a soothing influence when the nervous system is irritable."

Somewhat later Dixon got around to the subject again and wrote: "Until more is known, the only general rule that can be given applies to those who feel ill effects from tobacco. Obviously, such persons should be guided by

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the advice of physicians who have made thorough investigations of their particular cases." In an editorial published in 1928, the *Medical Journal and Record* added "The results of laboratory and testimonial studies on this subject show, above all things, variability of actual effect and biasing effect of opinion. . . . Like takes to like and sees superiority in those of like habits and like ideas." Germany's tobacco bill for 1912 exceeded in amount what she spent on her army. Dutch cigarets cost that country \$17,000,000 in 1927. Austria's smoking bill for one day in 1928 equalled her total annual deficit for all the tubercular sanatoria she closed for reasons of economy. Furthermore in Holland and Germany it is said that 30 per cent of the 6-year-old boys smoke, 50 per cent of those between 9 and 10, and 90 per cent of those beyond the latter age.

While I. Gray insists that smoking undoubtedly aggravates gastric symptoms, Dr. Wingate M. Johnson avers that his paternal grandmother smoked, had 17 children, and they were all well and sound; his maternal grandmother also smoked and produced 12 excellent children. His mother smoked from the time she was a girl until she had reached 80 when Doctor Johnson wrote; she had had 15 children and reared 12 of them to be healthy adults. All her 5 sisters smoked incessantly and they all had healthy families of from 8 to 14 in number. Finally, all these ladies nursed their young in the good old fashioned way. Yet two scientists rise up at Cornell University to remark that smoking 20 to 25 cigarets a day will decrease

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the milk secretion of young mothers and to say they can trace small quantities of nicotine in this milk. On the other hand, and there always seems to be another hand in these experiments, while nicotine seems to suppress milk secretion likewise in cats and cows, experienced obstetricians deny having noted any untoward effects of smoking upon the milk production of the human mothers for whom they cared. Finally, getting to the other end of life, F. Lickint studied the cases of 100 men who had attained the age of 90 or more. Of these 19 had never smoked, 32 still smoked, and 39 formerly smoked. None of them inhaled. In some obscure way Lickint concluded that nicotine is injurious to health.

When I was young I was told that smoking "coffin-nails" would stunt my growth. I escaped the curse by not smoking, but I never grew to very astonishing proportions either. Recently C. H. Thienes has shown that "Nicotine had no apparent effect on growth, as judged by the weight-growth curves," of mice! Dr. Wingate M. Johnson, in his clinical study of "Tobacco Smoking" published in 1929, declared tartly, "There is no foundation for the popular belief that smoking decreases the weight of an individual." Doctor Johnson studied 150 smokers and 150 nonsmokers aged from 20 to over 60. He said, "In my series, the average weight of the smokers is slightly greater in every group but two, and the average weight of all the smokers is 164.4 against 161.08 for the nonsmokers. This upsets the old idea that 'smoking keeps a man thin,' and contradicts the advice recently

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broadcast to 'reach for a cigaret instead of a sweet.' ” Doctor Johnson, to finish up with his paper at once, also held that tobaccō plays no major part in causing angina pectoris; that, if anything, it slightly reduces the blood pressure, and that its real effect is chiefly local, being exerted principally on the pharynx. It should in all justice be added that Doctor Johnson hails from Winston-Salem and that his ideas of scientific methodology are at times, as in his weight reports, somewhat bizarre.

Speaking of efforts made recently to have doctors endorse the commercial advertising claims of certain cigarets, by giving them a bribe of a carton of 100 cigarets, Dr. R. B. Morris told the Bronx County Medical Society in 1929 that—

Whether a doctor smokes or does not smoke has nothing to do with his opinion about the effect of cigarets upon the women and children among his patients. At present the medical profession is concerned over a widespread attempt to increase the market for cigarets among adolescents. This effort is skilfully linked with the current fad of dieting in order to maintain the fashionable feminine figure. It goes without saying that no reputable physician will recommend smoking in any form as a means of aborting the natural appetite for food, whatever that food might be.

I turn now to Dr. Emil Bogen of Cincinnati who, in 1929, published a study of “The Composition of Cigarets and Cigaret Smoke.” He immediately dropped a bomb-shell by saying that “In an extensive study of the ‘blind-fold test’ at Reed College, Louis Goodman found his sub-

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jects unable to tell anything about the cigarets they smoked without seeing the label. In view of the widespread advertising application of this procedure, verification of his results was felt advisable." So Doctor Bogen verified. He found that the vast majority of smokers could not even distinguish between strong, medium, and mild cigarets or between domestic, blended, oriental, or West Indian cigarets, much less declare particular brands. A few "exceptional smokers may have the ability to distinguish between different classes of cigarets and even, perhaps, between different brands of the same general class of cigarets," but they were rare birds. Most of the answers by far were wrong.

Furthermore we read, "The moisture content of a score of brands of cigarets, as taken from the package, was found to average 12 per cent. It is interesting to note that the brand of cigarets widely advertised as 'toasted' showed a comparatively high content of moisture." The average nicotine content of domestic brands of cigarets was 2.50, of the blends 1.90, of the oriental 1.44, of the "denicotinized," 1.10, and of the West Indians 0.86 per cent. I shall have something further to say about denicotinized cigarets a little later. It is to be noted that the West Indian cigarets, though low in nicotine, aldehyde, and furfural, nevertheless were reported to be highly irritating to the mucous membranes of the smokers. Cigaret stumps were found to contain 16 per cent more nicotine than whole cigarets, indicating that some of the poison was thus filtered out of the smoke by the tobacco

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in the mouth-end of the fag. The following table is of interest as indicating the pains and pleasures of cigaret smoking.

Pains and Pleasures of Cigaret Smoking by Percentages as Reported by Subjects of Tests (made by Emil Bogen, M.D.)

<i>Pleasures of Smoking</i>	<i>Per Cent</i>	<i>Pains of Smoking</i>	<i>Per Cent</i>
Sociability	65	Shortness of breath	35
Fragrance	60	Biting and irritation	30
Relaxation	50	Coughing	30
Stimulation	50	Burning	15
Steadying nerves	45	Nausea	10
Smoothness, mellowness .	35	Palpitation of the heart. .	5
Quieting hunger	30	Hoarseness	5
Sight of the smoke	25	Salivation	5
Feel in the lips	25		
Feel in the hand	10		
Taste	5		

I should say that the ayes have it by a considerable majority. Boden also declares that while smoking after meal time may relieve nervous strain, increase digestive secretions, and harmlessly allay appetite, its use before meal time tends to impair appetite and interfere with the psychic digestive processes. Conditioned reflexes may make some require their cigaret as a prelude to mental work, to physical labor, to sleep, or to defecation. But—

The role of idiosyncrasy, the development of tolerance, the factors affecting absorption, destruction and excretion of the nicotine and other constituents of the smoke and physiologic

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responses to them, as well as their toxicologic importance, await further investigation. . . . A study of more than 600 men in the course of an investigation of common colds showed that those who used a package of cigarets a day or more were much more frequently underweight than their fellows, and reported more often for treatment for acute respiratory infections, while those who used no cigarets at all were more frequently overweight and showed a lower incidence of respiratory infections.

By this time, if I have had my usual success at the art of obfuscation—and I have frequently been congratulated, not to say repudiated, for my ability to render a perfectly simple subject almost incomprehensible—you should be in a state of bewilderment. I am slightly confused myself, in fact I just tried to telephone my wife and inadvertently dialed a strange woman who told me she had eight children and a large bunion on her left foot. Perhaps it would be better, then, to consider denicotinized tobacco for a few paragraphs. In May, 1928, the Connecticut Agricultural Experiment Station produced its *Bulletin* 295. Herein ten pages were devoted to the analyses of various tobaccos and tobacco products, including some technical discussion of methods for the determination of nicotine.

During earlier investigations 27 samples of tobacco grown in Virginia and North Carolina had been found to range from 1.68 to 6.17 per cent of nicotine; 29 samples grown in various other parts of the United States averaged 3.38 per cent and ranged from 1.45 to 5.53 per cent.

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Fourteen samples of Havana Seed tobacco had ranged from 2.38 to 2.74 per cent. So much for previous work. The Connecticut workers found an average of 1.69 per cent nicotine in 20 odd brands of cigarets as purchased, ranging from 3.34 to 1.69 per cent. Incidentally the following popular brands contained the percentages of nicotine given:

Fatima, 2.79; Hassan, 1.94; Sweet Caporal, 2.05; Helmar, 1.56; Omar, 1.98; Chesterfield, 2.77; Camel, 2.21; Old Gold 2.17; Murad, 1.52; Turkish Trophies, 1.44; Piedmont, 3.34; Taryton, 1.75; Rameses II, 1.73; Pall Mall, 1.38; Condax, 1.06; Phillip Morris, 1.48; Mecca, 2.17; Richmond Straight-Cut, 2.79.

Lucky Strike Plug Tobacco contained 1.76, Old English Curve Cut 1.94, Prince Albert 1.82, and Tuxedo 2.22 per cent nicotine. The cigars analyzed contained about 3.30 per cent nicotine. In short, ordinary tobacco products averaged 1.77 per cent nicotine, on an air-dry basis, with a maximum of 2.89 and a minimum of 1.06. Similar analyses of so-called "denicotinized" tobacco products gave an average of 1.28 nicotine with a maximum of 2.51 and a minimum of 0.67. Among these latter might be mentioned the following, with their percentages of nicotine:

Sano cigarets, 2.51; Sano cigars, 1.27; O-Nic-O cigarets, 0.95; Sackett smoking tobacco, 0.98; Sackett cigars, 0.67; Sackett cigarets, 1.07; Dormy Turkish cigarets, 1.19; Dormy smoking tobacco, 2.26; Cestrada Virginia cigars, 2.26.

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The following table briefly expresses the results:

NICOTINE ON A MOISTURE-FREE BASIS IN—

	<i>Ordinary tobaccos</i> (58 analyses)	<i>"Denicotinized" tobaccos</i> (17 analyses)
Maximum	3.63	2.73
Minimum	0.47	0.47
Average	1.96	1.41

Hence the denicotinized products contained about 30 per cent less nicotine than the ordinary products, while it was quite possible to select an ordinary tobacco product which ran as low in nicotine as a denicotinized product. Unprocessed cigarets had a nicotine range of from 1.1 to 3.2 per cent and the denicotinized from 1.2 to 2.7 per cent; the respective ranges for pipe tobacco were from 1.6 to 2.3 and from 1.1 to 2.5 per cent. It is also quite natural that the "denicotinized," or processed, tobacco products would be used far more freely by smokers than straight tobacco, thus defeating the purpose of removing a portion of the nicotine anyway. Furthermore, since nicotine is almost certainly not the sole possible injurious substance in tobacco, the entire scheme of denicotinizing rests upon an irrational basis. Indeed it is more than probable that the satisfied smoker of denicotinized products would so far increase his tobacco consumption as to make his intake both of nicotine and of other possibly deleterious substances a menace indeed.

These analyses were given wide publicity among doctors by the *Journal of the American Medical Association*. By January, 1929, *American Medicine* had

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become sufficiently aroused to have analyses made independently. For purposes of comparison it used mild Marlboro tobacco and the mild Orlando cigar; these contained 2.33 and 1.55 per cent nicotine respectively, on a dry basis. It then had Sano cigarets and tobacco analyzed and found 0.77 and 1.09 per cent nicotine respectively; finally, Sackett denicotinized cigarets and tobacco contained 0.96 and 0.49 per cent nicotine respectively. Turning the figures into milligrams this meant that each Marlboro cigaret would provide the user with 21.2 milligrams of nicotine and each Orlando cigar with 112.8 milligrams; the respective figures for Sano denicotinized were 7.0 and 82.4 milligrams; for Sackett denicotinized they were 8.8 and 37.0 milligrams. The conclusion reached was that denicotinized products did contain very appreciably less nicotine than average mild unprocessed tobacco products. It will be observed that Sano products also contained very considerably less nicotine according to these analyses than according to those reported by the Connecticut Station.

Certain studious German-Swiss workers have disclosed that German brands of cigarets contain from 0.7 to 3 per cent nicotine and that from 21 to 36 per cent of this enters the mouth of the smoker; this is designated as the "main stream." In smoking with inhalation from 8.1 to 17 per cent of the total nicotine content is absorbed; without inhalation only from 2.5 to 4.4 per cent is absorbed. More nicotine is absorbed from short, thick than from long, thin cigarets; one-third more is absorbed from

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loose than from compactly made cigarettes; 30 per cent more enters the mouth of the smoker from dry than from moist cigarettes. The proposal was made that manufacturers print the nicotine content of their products on the packages; this again assumes that nicotine is probably the only harmful substance in tobacco.

Dr. J. D. Rolleston wrote in 1930 that in Germany the average cigar consumption per male over 14 was 300; the average cigaret consumption by adults of both sexes was 700 annually. In 1928 some 102,764,698,000 cigarettes, 8,036,714,162 cigars, and 378,874,261 pounds of tobacco in other forms were consumed in the United States. It would appear that if tobacco is very harmful we are becoming nationally immunized to the deleterious effects. Dr. Rolleston also said that the word "denicotinized," as applied to processed tobacco products, was a misnomer because many of them contained as much or even more nicotine than unprocessed products. Recent experiments have demonstrated some success in producing by special breeding a tobacco that contains nicotine in unusually small quantity. The relation of tobacco to health has probably been studied more extensively in Germany than anywhere else, and some German doctors hold that inveterate smokers should have frequent medical inspection. Unfortunately the Germans have little more to go on than we do and, scientifically, it remains an open question whether the harm done by tobacco is not more than overbalanced by its benign effect upon the nervous

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systems of persons who have conditioned themselves to relaxation by its use.

It becomes obvious that tobacco is a curious as well as reputedly a filthy weed. Smoking slenderizes you, but it does not decrease your weight; it tends to decrease the weight of the smoker but has no effect upon his poundage *avoirdupois*. The use of tobacco provokes untoward gastric symptoms but, especially when used after meals, improves digestion. It causes irregular heart beats and palpitation, but has no physiological effect other than a mild irritating one upon the pharynx. It kills the newborn babies of smoking mothers, but, if the mothers smoke, they can produce healthy offspring by the dozens. Tobacco is more moist if toasted, it contains considerable nicotine if "denicotinized," and you can recognize your own brand if blindfolded (you, not the cigaret) once in 10 or 12 trials, because your nose knows. Forty years ago a physician told my father to stop smoking or he would die. Every Decoration Day for 35 years now my father has placed a green tobacco leaf on the doctor's grave with his compliments. When the doctor said "he" would die, the doctor evidently meant himself.

However, in all this welter of confounded confusion a few inconsequential findings stand forth and wear the modest aspect of tentative, if not the regal garments of revealed, truth. 1. Smoking cigarets is the least harmful and pipe-smoking the most harmful method of using tobacco; 2. cigaret papers are harmless; 3. nicotine is

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not the only possible source of harm tobacco contains; 4. the blindfold test shows more imagination than unbiased observation; 5. the use of tobacco does not appreciably stunt the growth; 6. the benign psychological and social effects of smoking tobacco apparently so far overbalance the possible malign pathological effects it may have, that it seems reasonable for adults in good health to smoke temperately along until they rip a tendon or sprain an artery and have real reason to consider diminishing the number of their bad habits.

But the basic fact remains that truly scientific experiments have not as yet been performed to ascertain the effect of tobacco smoking upon human beings and, from twenty years' experience with scientific method, I confess I cannot now imagine any practicable manner in which they could be carried out successfully. Suspended judgment and caution win again, and dogmatic beliefs, no matter by whom endorsed, are scientifically untenable.

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CHAPTER IX

ON GENTEEL STOOPING AND BENDING

IGNORANCE occurs in varied forms. Facts do not comprise the sole ingredient of truth. "Truths" come into being when varied facts are organized into a system of belief. Consequently, very many things may be true, within the limitations of their own system, and given the postulates and assumptions the system requires. All sorts of facts may appear to verify the truth of the system. Ignorance is, therefore, relative, but it is almost always a joyful sort of thing, because we are normally happy in the truth of the systems of belief we have selected as worthy of our credence, and we remain joyfully ignorant of antagonistic or competitive systems. New knowledge invariably brings pain and menaces the joy of ignorance, because it is a sore thing to discard old and faithful beliefs in order to embrace the new and the unknown.

There was once a well known athlete and strong man named Siegmund Breitbart. He died in October, 1925. On the following November 2 the "Breitbart Institute of Physical Culture, Inc.," was organized with Frederick S. Engel of New York as a promoter and manager. On October 18, 1931, the Federal Trade Commission ordered

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this Institute to "cease and desist, among other things," from representing to the public "that Siegmund Breitbart, deceased, is a living person and connected or associated with the respondent's said business." The Institute sent forth, in answer to inquiries, a book called *Muscular Power*. This contained, besides instruction, a group photograph of six nationally known athletes and promoters, including four former national champions in pugilism and wrestling, grouped about a photograph of Siegmund Breitbart. This was the "Breitbart Advisory Council" including Tex O'Rourke as "Chairman," Jack Dempsey, and Dr. B. F. Roller.

Advertisements not only promised results from this method of physical development at the very start, but added, "The pupil gets the wonderful course in physical education under personal direction of the Great Advisory Council all the time, right in the privacy of the home, just as if they were present personally talking to each pupil and telling him what to do." It is interesting to note, therefore, that the Council had never met, that its members merely loaned their names to the Institute but had no connection with its business or course of instruction, and that they never conferred regarding the lessons sent out. The Commission ordered the Institute to stop using this sort of advertising.

The Institute also published "before and after" photographs of persons who had benefited from its ministrations which the Commission demanded it discontinue doing "unless such person has accomplished that develop-

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ment by following instructions in the Institute's lessons." The Institute sold a "Muscle Builder" apparatus. But it was in the habit of advertising to the effect that it would deliver lessons and apparatus in a stated time, whereas the "Institute either did not intend to deliver or knew that it had reasonable grounds for knowing it would not be able to deliver the material within a reasonable time." During 1928-30 the Institute had two regular employees: Frederick S. Engel, president and manager, and a woman clerk at \$25 a week. During 1929 a second woman clerk at \$25 weekly was employed.

Here is an interesting head-on conflict between two systems of belief. People who are animated by a powerful religious faith in the ability of exercise to remedy all ills have little trouble in finding the work of such institutes of physical culture very advantageous indeed. Doubtless this Institute benefited thousands of such enthusiasts who stand forth immodestly clad and with tense, serious expressions, pant through the daily dozen at the command of the magi in the radio cabinet. But along comes the Federal Trade Commission, addicted to a different system of truth, a system which looks upon dishonest statements in advertising as ignorance of the grossest sort. Like some village atheist with rude gestures suddenly demolishing the pious faith of some ardent adolescent in the existence of a merciful God, the Commission lifts its unhallowed voice to declare to all and sundry worshippers of the big muscle men: "Hear ye! The Great Breitbart Advisory Council in which ye have faith does not exist!

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The God Breitbart is not living, but dead! Again have ye children of ignorance been victimized by a hoax. In knowledge is truth, but also much sorrow."

Now, being by nature physically lethargic, my own inclination is to think that physical exercise is not half so beneficial as its enthusiasts find it. In my own perverse human way I therefore pounce upon evidence likely to support my contention. For a long time the irregular habits of the King of Spain solaced me. Now, of course, since he is no longer King, I am not so sure. However, I do recommend a little delicate exercise and Alphonso, according to authentic reports, took none.

A few years ago the American press featured a communication from Viscount Aguilar, then private physician of the then King of Spain, which expatiated upon the singular irregularity of His (then) Majesty's physical and nutritive habits, and remarked particularly the paucity of physical exercise in which he indulged. The implication was that he enjoyed excellent health largely because he persistently violated most rules of hygiene. As His Majesty happened to share my chronological age these remarks arrested me. Indeed that is almost the only thing we then had in common, the quality of being about forty years old, for even our marked tendency to inverse pulchritude is, in each case, a thing of peculiar and unique character arrived at by an entirely different complex of mistakes in the assembling of our features. Even at that I feel moved to aver that a little stooping and bending, such as one indulges in attending the wants of a not par-

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ticularly new or efficient furnace, or in raking leaves and carrying them somewhere in a basket (to deposit them that they may soon blow all over the place again)—a little stooping and bending would be a great help even to King and Ex-King Alphonso. Here the king's subjects were decidedly better off than he, especially when they approached His Majesty's person. Yes, I feel I must rudely insist, a little stooping and bending would not go amiss.

Nothing violent, please understand me; nothing to cause undue perspiration or cardiac intensity or respiratory disturbance or gastric distress—but only a little quiet and easeful stooping and bending and such other genteel motions of the organism as are calculated to mobilize every muscle therein and leave none unelongated or unstressed. For, again appealing to the press, I find that a gentleman of 61 was discovered in his Washington, D. C., apartment, the radio merrily erupting setting-up exercises, the dumbbells gripped in his cold hands—stone dead. His death was assigned to “exertion due to exercise.” He had quite obviously shared the very common American delusion that exercise, to be at all beneficial (and I shall argue about even that beneficiality somewhat later) must be a thing of great violence, a veritable muscular convulsion calculated to impress upon the mind of its victim that exercise has been had and is very very good for one. That I may at once ground this casual statement in well authenticated scientific fact I shall stop here to quote copiously from the famous *Bulletin* 23 of the Carnegie

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Foundation on "American College Athletics" which expounds the word as follows:

In the first place, the notion appears to be very widespread that exercise in general and athletics in particular constitute a sort of panacea for all forms of ill-health from flat foot to melancholia. As a matter of fact, athletics should be regarded as somewhat in the nature of a powerful medicament to be prescribed for one individual in one strength, and for another individual in another strength, and for a third individual to be absolutely proscribed. Neither facilities nor incentive for participation in active sports are provided for a large group of students, high school and college, who are physically fit but who do not possess distinguishing qualities or abilities that might make them serious competitors for places on intercollegiate teams. Secondly, there exist serious deficiencies in the relations of the medical profession to college athletics. All athletic aspirants are not subjected to adequate physical examinations to determine their physical fitness for participation in athletics in general and for any one sport in particular. Moreover, there is a lack of adequate medical care and supervision of athletic participants while engaged actively in training or in competition. . . . Thirdly, it cannot be too often repeated that certain unhygienic practices that are common athletic practices would not be tolerated elsewhere. For example, very often the same athletic clothing is worn without washing throughout a four-year period of track competition. It would be difficult to discover a more virulent example of the working of superstition in modern life. The use of the common drinking-cup, water bottle, and sponge in other aspects of daily life than those pertaining to college athletics is now prohibited by law in most states of the Union. General uncleanness of athletic clothing, locker rooms, and wrestling mats gives rise to such diseases of filth as ringworm and impetigo. Finally, in high schools sched-

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ules of track and field meetings, swimming meets, and basketball games are commonly excessive. In both high schools and private schools athletes are permitted to compete in an excessive number of track and swimming events in the same meet and such participation is frequently urged upon them.

I should like modestly to applaud Dean F. Smiley, M.D., Medical Adviser of Cornell, for these words, but at the same time to differ from his implication that physicians can always advise well about physical exercise. On the the contrary, I doubt very much that 1 per cent of our physicians are really well informed on the subject of physio-therapy. They repeatedly fail to sense the scientific value of massage and corrective exercise in cases of circulatory disturbance or even of such serious things as paralysis, and they are apt to share the common American delusion that the acrobatics of the calisthenic cult before their open windows in the morning fifteen minutes, constitute something both scientific and beneficial. Exercise is a medicament. The very use of dumbbells implies at once that the exercise is therapeutic or corrective. The nature and extent of exercise should always be individually prescribed.

This Carnegie *Bulletin* 23 is largely devoted to the exposition of a fact long ago expressed by a Chinese student in somewhat these words: "An American university is an institution of physical training where certain intellectual discipline is especially provided for feeble-bodied students." This opens the spacious subject of the historical relationship between gymnastics and mental

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culture, with which I must deal most briefly. The gymnasium of the ancient Greeks was originally a school where competitors in the public games received their instruction, and was so named from the happy circumstance that said competitors exercised in the nude. Ultimately, however, the institution became connected with medicine on the one hand and with mental education on the other, and provision was made in the gymnasia for complete mental, moral, and physical training. Philosophers came to talk or to lecture in the gymnasia and they became places of general resort for intellectual pursuits, as well as for physical exercise. Thus Plato gives much attention to what we call gymnastics when he discusses education, and points out that the sophist, Prodicus, first found such exercises beneficial to his own weak health, and formulated a method upon which Hippocrates and Galen made improvements.

This, like so much other human knowledge, was forgotten and neglected and Rousseau centuries later again called attention to the importance of physical training as an adjunct to sound education. F. L. Jahn and his followers succeeded in establishing in Germany the *Turnplätze*, or gymnastic schools, and the educational reformers Pestalozzi and Froebel both emphasized the need for systematic physical training in any complete scheme of education. Outside Germany and Sweden, however, and especially in America, gymnasia and gymnastics have not been contaminated with intellectual accretions, and physical exercises, with or without appliances, have become

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the conventional therapeutic indoor sport. The dumb-bell, probably so-called from the head of its inventor, was in use in England in the time of Elizabeth and the exercises which can be performed with it are really astounding.

Before the end of the 19th century the medical profession became thoroughly convinced of the therapeutic (or suggestive?) value of physical exercises and, if carefully prescribed and arranged upon scientific principles based on exact anatomical and physiological knowledge, they can indeed be beneficial. But as indiscriminately broadcast by radio to any and all who wish to indulge in muscular contortions as vigorously as they possibly can, exercises are worse than useless; they are dangerous. I say this advisedly because my masseur, a man of four years university training, who acts as critic as I write, tells me he was compelled to deprive his patients of books containing diagrams and explanations of exercises too strenuous for the individual in question, simply because every American considered it not only his right, but his duty, to perform the hardest exercise in the book as often as he possibly could, and greatly to the detriment of the carefully thought-out regime his masseur had prescribed.

I can still picture in my mind's eye an elongated and extremely attenuated gentleman of neurasthenic diathesis who, animated by the faith which passeth understanding, was seduced by the gospel of the big muscle boys into the belief that "wholesome" exercise would gratuitously proffer him a physique. His room was adorned on all sides

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with pictures of complacent looking morons displaying enormous biceps and arrayed in self-satisfied smiles, and hardly anything else. I accused him of burning candles before them at times but this he breathlessly denied as he sought to contract his six feet three sufficiently to do some labored floor-reclining stunt in a hall bedroom. As a matter of fact he was biting the carpet at the time. Indeed he was later compelled to omit this particular exercise from his repertoire as he had the carpet all bitten to pieces. Besides his mentor by correspondence had by then sent him a leather gadget which he was to masticate energetically to render his jaw prognathic. He discovered after infinite pains and agonizing exertion that the exercises neither fabricated a physique nor banished neurasthenia, and his expenditure in various exercising appliances alone almost bankrupted him. Meantime I who have sedulously avoided all sorts of physical stress, except my homeopathic stooping and bending, am assured by my masseur that I have a really remarkable physique. (My autographed photograph and endorsement are for sale at the current rates.) And a globe-trotting friend assures me that the more inland male South Sea Islanders who, he declares, do nothing more strenuous than suggest tasks for their wives to perform, and climb an occasional tree (for reasons that may easily be surmised) have astonishing musculatures.

My well-trained scientific masseur was recently requested to take charge of the gymnasium in a fashionable modern apartment house in Washington, D. C. When he

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went to look the place over he was both amazed and astounded to find sufficient expensive apparatus to equip a physio-therapeutic institute for the treatment of all sorts of diseases and yet, presumably, this gymnasium was for simple exercise on the part of normal, healthy individuals who require practically no equipment whatever. This led him to visit schools in the same city where he found children vigorously and jerkily making physiologically absurd thrusts and punches at the behest of an instructor who seemed to know no more than they did, but who admonished them to go at it with vim and snap.

In similar manner I myself observed several hundred people on the beach at Atlantic City the summer of 1929 going through the most astonishing antics in imitation of a robust individual who was lifted up before them (as the serpent before Israel) in a high place, and who told them by all means to perspire vigorously and to "put a lot of snap into it." And any morning at all the city stroller, who is not too modest, may observe enthusiasts of both sexes, scantily clad, making obeisance in most extraordinarily fatiguing ways to a curious box from which noise exudes. Yet this exercise is usually performed in such a way that it can have no positive physiological effect; it is not especially suited to the individual and it is almost always entirely too vigorous. Furthermore, since an hour of the most violent football does not reduce the player's weight more than a few ounces (bar the large water loss from the tissues which is very soon

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regained) the idea of reducing weight by violent exercise is founded on fallacy.

Our athletic cult fails to distinguish between corrective or medical and normal or pedagogic exercises. It fails to distinguish between the mild muscular mobilization a chronically sedentary individual requires and the rigorous training required to make a person a sport specialist. It tends to hold up to admiration the expert swimmer, golfer, shot putter or whatnot, or the man who has developed to enormous hypertrophy muscles which he does not need and which, in this state, simply throw more work upon his heart, lungs, and digestive tract than they would normally have to do. In America it is rare anyway for a person to exercise merely for physical well-being; it is much more common for him to seek to excel at something which involves an ill-balanced training that is ultimately most deleterious.

Since it takes three or four years intensive training to give an expert the scientific background in physiology, anatomy, and physio-therapy to advise exercise wisely for the individual, it is quite apparent that few medical doctors now in practice can safely do this. Writing on health supervision of industrial executives, Halstead G. Murray, M.D., said not long ago: "This exercise (gymnastics) followed by a hot and a cold shower, strengthens their resistance during the winter and helps to relieve the fatigue accumulated during the day!" This is a very broad statement and would be only partially true if the

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exercises were most carefully prescribed individually by a man with medical training who specialized in this work.

Few people are 100 per cent healthy and can afford to risk indiscriminate exercise. There is where the medical doctor can be of great service and he should decide whether or not an individual is physically fit to undertake a specific type of exercise. Since I began with the former King of Spain it seems appropriate to observe that Dr. Oller, then director of the institute of physical education of Madrid and president of the regional football federation in the central provinces thereof, expressed his intention of having careful physical examinations made of all men who play football. He believed that many acquire serious disease and die because of this sport, and he intended himself to decide whether players were medically fit for it. It appears that football is excessively popular in Spain where people believe, as they do here, that its most serious aspect is risk of injury. Not so at all, said Oller. The chief sources of danger lie in the heart and lungs. Many football players have died from tuberculosis and players with latent lesions have had serious attacks after violent exercise. Dr. Oller recommended that a rigorous physical examination for a license to play be made twice a season, and that beginners especially undergo them before submitting themselves to absurd and forceful training.

In Berlin (and of course in Sweden) this same attitude is taken towards exercise. Dr. Oller himself is obviously Swedish. In 1928 a book on the therapeutic and medical

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aspects of exercise appeared in Berlin, in which it was remarked that no doctor is fitted to treat sportsmen unless he thoroughly understands the sports concerned. The book was a symposium by various doctors, and Professor Bier went so far as to hold that every doctor who advises therapeutic exercises must himself have exercised and must understand the subject thoroughly. Physicians were advised to follow an elaborate form in the examination of candidates for school sports, and football, boxing, wrestling, swimming, rowing, skating, ski-ing, cycling, and flying were each considered in detail.

In Austria no one is permitted to compete in athletics until after the most rigid physical examination; a careful personal history is taken of habits and reactions, and disorders of the heart and lungs, of which the patient is unaware, are frequently found. No charge is made for the examination. It was interesting to note that football players and those who engaged in heavy athletics especially endeavored to avoid the examination, if "professionals," being fearful of untoward results.

In Great Britain school athletics have been given especial study. Lancelot R. Lempriere has been protesting for twenty years against the deleterious effects of over-violent exercise upon the young. He cites a number of fatalities due to athletics and numerous cases of fatigue, lassitude, diminished or inferior intellectual output and loss of weight, and insisted that moderation should rule. An editorial in the *British Medical Journal* in 1930, after reviewing the diverse opinions given on school athletics

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at a meeting of the Hunterian Society in March of that year, said:

Out of such diverse opinions it is hard to draw a conclusion. Is it possible that the individual is the best judge of his own exercise requirements? The energetic boy is not readily deterred from exertion and the more placid type has possibly less need of exercise. We accept the habits of animals as natural, and believe them to fulfil their exercise requirements; it is at least conceivable that the intelligence of the human child is sufficient to inform him when it is necessary for him to run, and when he will profit by leisure.

In editorial comment on the Olympic games of 1929 the leading American medical journal noted the especial heart examinations given to all athletes before and after the games. Previous observations were confirmed to the effect that cycling, rowing, long-distance running and ski-racing tend to cause permanent enlargement of the heart in relation to body size and weight. Such changes do not always occur but tend to be restricted to individuals of certain constitutional types. Competitive racing, boxing, and wrestling also place great demands upon the heart and varied disturbances in beat occurred after participation in the games. Yet only this summer I was told by a worried father about the violent, and injurious physical exercise the girls of a Colorado town were forced to undergo in public school at the command of a brutal and manlike female teacher who insisted that they perform stunts seldom tried by any but professional gymnasts.

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M. Boigey has also observed how very bad the haphazard prescription of therapeutic exercises can really be, yet our average physician is inclined to say we need more exercise without becoming at all specific. Three cases cited by Boigey deserve brief description. The first was a man of fifty-seven, plethoric and suffering from high blood pressure, who was regularly performing a series of movements while lying down; he died suddenly while thus indulging himself, and cyanosis, congestion of the blood vessels at the base of the brain, and hemorrhage of the left third ventricle disclosed the cause. The second was a slender and apparently healthy man of forty-nine who had, however, what is correctly entitled "compensated syphilitic aortic insufficiency"; he had been advised by a doctor to run a hundred meters each morning and he did so until one day when he felt suddenly suffocated and died soon after reaching home.

Finally, Boigey tells about a plethoric and hypertonic gentleman of fifty-nine who was advised by a doctor to change his cold morning bath for a tepid one. He did this for a while but was finally overcome by the blandishments of some health faddist and changed back to his icy morning plunge whereupon he had a stroke, because vascular constriction takes place when we enter a cold bath, this causes momentary hypertension at the time of immersion and is bad medicine for older people. Boigey continues that the kind and amount of exercise must be carefully regulated for each individual, and adds that the aged, the sedentary, the hypertonic and the plethoric should be very

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careful indeed about taking exercise; what they do take must be not too vigorous and the head should always be held upright—as it can be, of course, in my genteel stooping and bending.

However, something should be said about the health value of exercise. In answer to a physician's query on this subject the *Journal of the American Medical Association* once had this to say: There is no evidence that physical education affects longevity one way or the other. Pearl and others have pretty definitely shown that the only way to live long is to pick long-lived parents. Female longevity is quite consistently greater than that of the male, yet the female quite as consistently exercises less; of course, a sex variable enters here and even the metabolism of the two animals is different. There is little or no exact scientific information about the effect of exercise on general health although properly prescribed corrective exercises for the feet, the posture, weak muscles, or constipation are very beneficial.

The opinion that exercise of any sort is beneficial is based upon the fact that we feel better after exercising. That this may be true even when the exercises are shockingly unscientific is quite suggestive. At any rate this evidence is not scientific, and even the apparent increase in the white blood cell count due to exercise may be mere evidence of some sort of internal redistribution. "By analogy, by all the related facts of growth and development, it may be argued that exercise has hygienic possibilities. Adequate proofs that it has are not available

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at present." Here my masseur disagreed so violently that I was compelled to hold a cake of ice to his head and pour barley water over him. His theory is that the American doctors are misinformed, but the only evidence he cites is in Swedish, and I never have been able to read the language fluently on rainy Sundays in November.

Perhaps I had better turn to perspiration as a "good sweat" is part of the American daily dozen cult—a daily dozen, oddly enough, sent over the air by a Life Extension Institute, and yet scientifically calculated to do more harm than good to its devotees, simply because they exercise without exact information about their physical qualifications for the stunt in question. About 1926 one of the more austere journals read by biochemists—I may as well confess, it was *The Journal of Biological Chemistry*—contained an interesting article about a boy who was born without sweat glands. H. B. Richardson studied him and reported that, of course, he could not sweat. Unfortunately, he enjoyed excellent health by the simple expedient of wetting his shirt in the summer time.

This led the august *Medical Journal and Record* of New York (August 4, 1926) to observe editorially that the sweat glands have little eliminative utility or function and that they are not essential organs of secretion. This leads directly to the idea that exercising till you sweat is both silly and nonessential. It leads to the further observation that our human musculature is vastly bigger than we now need and that it is also ridiculous to develop unnecessarily a group of superfluous muscles, by over-

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eating or by over-exercise, merely to exercise more in order to eat more and keep them better in shape. In short, "it is highly questionable whether for health we need to exercise more than we are naturally inclined any more than we need to work our sweat glands systematically."

A medical specialist in whom I have great faith rather confirmed this by writing me thus:

I approve of your intention to write on the theory that exercise is not beneficial. From long observation I have come to the conclusion that it is very desirable for the big husky or for the man who is overweight. He apparently must get some exercise to keep his metabolism going fast enough to burn up the clinkers, if you know what I mean. A skinny fellow does not eat enough to have many clinkers and perhaps his metabolism is more economical anyway. There is no question that the light weights can live to a hoary old age without exercise. My father was a beautiful example of it. All he has ever done is to hoe weeds in his garden on Sunday. The asthenic should spend more time in bed and on a couch than on the mountain or in the garden, and I have had to learn for myself that when one is mentally fagged it does not help to get physically exhausted in addition.

This brings me to fatigue and I can say no more than Mosso has already said most effectively in a remarkable little book. You can fatigue a frog muscle, or any other muscle, by prolonged exertion thereof, but you can render it again contractile by washing it, through its artery, with a 0.7 per cent salt solution. You cannot use pure water because that is rank poison to muscles and (avaunt pro-

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hibitionists) would make them swell up—in short, it is toxic. Work done by a muscle which is already fatigued harms it more than a much heavier task performed under normal conditions. If the muscle is in your arm, and your arm is still attached to your body, massage or certain carefully defined types of exercise will rest it, too.

Sensitiveness may be fatigued; sensations fatigue us, also, and it then requires greater stimulus to produce a reaction than before. Nerves, alas, fatigue before muscles. Thinking definitely drives the blood towards the brain, and respiration is modified during attention. The heart beat differs in intensely excitable persons and if exaltation reaches a certain point of intensity they may pass into coma. The fatigued brain cannot be attentive and too violent physical exercise (and most daily dozens are far too violent) renders people too tired for mental work. Thus it is that Alpine ascents often result tragically merely because physical fatigue has so far dulled the senses that the mind cannot make sound judgments of distance.

We take about 134/1000 of a second to respond with the hand to a touch on the foot, but fatigue will almost double this time and distraction caused by the playing of a discordant hand organ can increase it 50 per cent! Stimulants, like coffee, decrease this reaction time which, Gaule declared, differed among nationalities—the Germans bumping clumsily into each other on the streets in a way Italians never did. There is no definite boundary between physical and psychological processes and the ef-

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fects of study, like those of love, stimulate the circulation, increase perspiration, cause high blood pressure, lowering then rising temperature, palpitation of the heart, vertigo, rapid pulse, difficult respiration, digestive disturbances and, finally, actual muscular fatigue.

Plato tells us that Empedocles "attended the dissection of one who died of love and that his heart was combust, his liver smoky, his lungs dried up, insomuch that he verily believed his soul was either sodden or roasted through the vehemency of love's fire." It can, apparently, get very acute indeed. Once fatigued mentally, however, whether by love or more lucrative pursuits, a change of occupation or a few calisthenics will not rest us up unless the fatigue is confined to a small brain area. Nervous and psychic energy are the only types we have and they can be restored only by complete immobilization and dispersal of thought.

Laboratory tests have shown that a professor is far less able to perform muscular work after he has prepared or delivered a trying lecture than before, and it would be very ill-advised for him to rush out and exercise to "re-store" his energy. Intellectual fatigue brings physical fatigue, lost muscle tone, and faulty circulation in train. Then violent exercise must be avoided and to raise the windows for ventilation, then stand mentally tired children up in school, and put them through some "snappy" calisthenics to "rest" their minds is scientifically the height of absurdity. Our high pressure education of to-day is already reflected in decreased vitality and in-

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creased pathological manifestations on the part of the children, and they should not be further tried by ill-advised physical "instruction."

In the time of Galen the lungs were supposed to maintain the tide of the blood by their rise and fall, to admit substances necessary to life from the air breathed, to discharge from the blood which perfused them certain "fuliginous vapors of an excrementitious nature," and to ventilate the blood and cool the heart. Today the lungs have other duties, according to science, and we waste \$2,500,000 annually by installing unnecessary and even hazardous ventilating systems in our public schools. Yet investigation has unmistakably shown that the old window-gravity method of ventilation is more satisfactory than the fan system, because it maintains more uniform temperature, humidity, and air movement. So the ignorance that is joy brings profit to those who need it least.

Coming back now to Ex-King Alfonso and to me—plain sedentary individuals need a modicum of physical mobilization to keep them in moderately decent trim. The Ex-King is, I believe, (our acquaintance is somewhat distant, of course) rather more active than I am. He seems to bustle about and do a great many things my congenital lassitude forbids me. To be more specific, since I definitely represent the office-chair inhabiting animal, I suppose I should lay down exactly the regime of exercise needed. I cannot because it is an individual matter. It so happens, for instance, that a minor physical weakness

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makes my case as unique as yours would probably be if you were properly examined. My mild bending and stooping; some head turning, bowing, and rolling; a series of exaggerated but genteel leg stretches, and a certain specified manner of climbing about eight flights of stairs daily does me very well. I can even exercise by walking, when I am taught how to walk for exercise, which, I confess, I do not yet understand, because that comes later in my course. The whole business occupies less than fifteen minutes; it does not fatigue; it will not cause a drop of perspiration even in summer and it is designed scientifically to mobilize certain groups of muscles in certain definite ways suited to my individual needs. I can only say—go thou and do likewise, if thou art fortunate enough to find a really scientifically trained expert in gymnastics and massage who is not a quack, a charlatan, a faddist, a fanatic, or a plain fraud and, unlike Sweden, we do not rigidly regulate the work of these men as we should if we were really civilized.

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This chapter was written with advice from, and occasional gentlemanly dissent by, Hugo Falck, expert medical masseur of Washington, D. C. My thanks to the *North American Review* for permission to reprint portions of this chapter which originally appeared therein.

CHAPTER X

A CLEAN TOOTH NEVER* DECAYS?

YOU may perhaps remember that among my mental weaknesses I confessed, a few chapters back, to a certain susceptibility to belief in what the car cards said. When I read that the vitamin C in oranges (two 8-ounce glasses daily) could alone give me healthy teeth, I almost believed it, but my sales resistance sustained me until I had discovered that the advertising statement was scientifically unjustifiable. By now I have become confused by car cards. For I just saw there the picture of a young boy, a Bond Bread child, and the inscription, "For sound, even teeth he needs Vitamin D." I have also seen there statements to the effect that I must eat plenty of calcium and phosphorus to have good teeth; that I must see my dentist twice a year to achieve this (my "naborhood" dentist, of course); that I must watch the pink marks on my toothbrush if I would preserve my teeth; that "A Clean Tooth Never Decays," and that any one of a dozen dentifrices will absolutely prevent dental decay. Many of these same dentifrices formerly prevented or remedied pyorrhea, but I understand that the U. S. Food and Drug Administration compelled them to

* Hardly ever?

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discard that claim in the interests of scientific accuracy. Anyway the advertising so hopelessly confused me that I wandered into a strange frat house and remained there for days, being mistaken for a house detective, until my wife advertised for me in the personal column. Then I determined to get at the facts about dental decay and its prevention. These facts I now state freely. May confusion be not worse confounded.

The ailing tooth is not a modern phenomenon. The ancient Egyptians were afflicted with both dental caries and suppurative periodontitis as far back as the records of man extend. Yet they lived on very coarse food, now supposed to exercise the teeth and keep them in fine gymnastic trim,—but they took vitamins C and D in insufficient quantities. Hippocrates (456 B.C.) was already surmising that toothache was caused by the stagnation of “depraved juices” in the teeth, and Galen in 131 A.D. actually wrote: “The lack of nutrition makes the teeth weak, thin and brittle. An excess of nutrition excites a kind of inflammation similar to that of the soft parts. A deficiency of nourishment not only causes the tooth to die away, but also enlarges the cavities.”

On the other hand we read that the prehistoric Indians of the Ohio country seldom had decayed teeth. The teeth of the aged were sound, but often worn down to the gum line. These Indians lived on meat, Indian maize, nuts, berries, grapes, tubers, and squash; cow's milk, with its calcium and phosphorus, was absolutely unknown to them, as well as its modern substitutes. Mc-

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Carrison has commented upon the fine physiques and teeth of the Sikhs who, however, live on whole wheat, milk and milk products, green vegetables, fruits, and little meat. Does diet govern tooth structure then?

Another common idea today is that pyorrhea is a modern advertising development. However, Dr. Roy. L. Moodie reports that pyorrhea has attacked the teeth of men from the beginning of time. No continent was free from it and undoubted traces of it are found among the skeletal remains of every race. The ancient Hawaiians, the prehistoric Peruvians and the North American Indians, ancient and recent, all suffered loss of efficiency, loss of teeth, and infiltrations of sinister toxins draining into their systems. The picture of a brave out hunting a scalp, suddenly afflicted with toothache and knocking the offending molar out of his mouth with his tomahawk is one to excite pity in any of us who are today far enough away from the brave not to be scalped. Worse still evidence of pyorrhea has been found among the mastodons of the Ice Age, as shown by the Cohoes mastodon mounted in the New York State Museum at Albany, and other undoubted evidences are found among the wolves and tigers of the California tar pits preserved in the Los Angeles Museum.

Having proceeded to this point I feel that I must become sufficiently erudite for a few sentences to create the impression that I know my teeth inside and out. If you will bear with me, or rather if you can bear it, I should like to grow warmly lyric about the histological

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structure of the teeth and caries of the enamel. I should like to say that the enamel is the hardest structure in the human body and consists of 0.4 per cent keratin and 95-97 per cent inorganic salts, predominantly calcium phosphate. I might also add that it consists of hexagonal prisms held together by a very narrow band of cementing material, and that 1 per cent hydrochloric acid is capable of disintegrating it quite successfully, which no doubt explains why many toothpastes advertised to whiten your teeth contain that powerful corrosive.

The teeth also consist in part of dentine which, in its turn, contains 28 per cent organic matter, 10 per cent water and 62 per cent inorganic salts, and also almost certainly is provided with some living protoplasm. It is microscopically porous and full of tubules, and occurs under the enamel. Cementum which holds the tooth structure together is essentially like bone; it can be absorbed and redeposited, is much softer than either enamel or dentine, contains less inorganic matter, and is better nourished. Finally, there occurs the pulp, alias periodontal membrane or gingival tissue, which is all the same thing—but different. The pulp contains blood and nerves (plenty of nasty yowling nerves) and also a layer of odontoblasts, difficult as it is to believe. The periodontal membrane is full of noncalcified fibrous tissue and also contains blood vessels which nourish the pulp. I could say a great deal more, but have probably vindicated my claim to know more than you do about teeth, when I am looking at the book, so why bother?

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You remember I saw the statement "A Clean Tooth Never Decays." I have also read an article which stated that over 90 per cent of the American school children, inveterately addicted as they are to toothbrush mania, have dental caries while more than 90 per cent of the little Italian immigrant children who used to come into this country before we got afraid they would take all the jobs away from the big American men had perfectly sound teeth—and they had no slightest idea what a toothbrush was. Finally, you have undoubtedly seen all sorts of advertising claims regarding the merits of different dentifrices: they used to cure pyorrhea; they correct mouth acidity; they destroy evil mouth bacteria; they prevent dental decay, etc., etc. Well, in October, 1930, the American Dental Association published in its *Journal* two authoritative scientific paragraphs about dentifrices. I shall record them here, permitting you to compare them with the car cards yourself.

Toothpastes and powders on the market today may in general be placed in several groups or combinations of groups; namely, those depending primarily on soap for their cleansing action; those containing small amounts of organic acids; those containing magnesia magma or other alkaline substances and those containing other substance or substances, such as potassium chlorate, calcium phosphate, organic or inorganic astringents, antiseptic or germicidal substances, enzymes, etc. These substances are generally admixed with chalk for abrasive action and incorporated in paste form by glycerol (or glycerite of starch), tragacanth, acacia or other pharmaceutic binders.

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Many dentifrices on the market today are unnecessarily and irrationally complex in composition. The Council desires to point out that the aims of rational therapeutics and "oral hygiene" are defeated by the use of complex mixtures, not to mention the large economic waste in the sale of highly complex mixtures when simpler combinations are just as effective. This is in keeping with the well known observation that *dentifrices have no direct demonstrable therapeutic action. The sole function of a dentifrice is to aid in keeping the mouth clean by the removal of loose food debris by the mechanical use of the toothbrush.*

The italics are mine. This quotation needs no exposition. No dentifrice can have a therapeutic action of any sort. Obviously the toothbrush would perform almost as well alone. If, however, some substance really soothing and beneficial to the gums was desired, brushing the teeth with a pinch of salt and soda will perfectly accomplish that purpose. Furthermore no toothbrush can be made to conform to the dental arch both inside and outside. Small toothbrushes are better than large ones and those sold are usually too large. Elongated tufts of hairs at the end of a toothbrush will not work efficiently.

The medicines and drugs incorporated in many of the popular and widely advertised dentifrices are valueless and only afford the manufacturers selling talks to get their product before the public. Laboratory experiments lead the investigator to conclude that some dentifrices are put on the market in utter ignorance of the dental and biological principles involved, or with intent to mislead the multitude.

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I am quoting now from *Hygeia* as far back as October, 1926. Pepsodent, for instance, was shown by Gies and his coworkers to have been utterly irrational and unscientific in character. The dentifrice plays a very minor part indeed in mouth hygiene; the same may be said for mouth washes. In some cases perfume takes the place of cleanliness, while warm water impregnated with a teaspoonful of common salt per pint, with a slight addition of sodium bicarbonate, serves all rational and scientific purposes of mouth hygiene. It is, however, a singularly prosaic and pecuniarily unprofitable procedure to use it.

In 1929 Dr. W. R. Davis, Director of the Bureau of Mouth Hygiene, Michigan Department of Health, told the American Child Health Association that the slogan, "A Clean Tooth Never Decays," had done great harm in preventive dentistry. "This expression is true only for surgical cleanliness, and surgical cleanliness is impossible, as far as we know, in the mouth of a live person and not very important in a dead one. Many teeth that are brushed decay and many teeth that never saw a toothbrush never decay." He derided school boards and teachers for believing in the efficacy of toothbrush drills, and the unreasonable advice to brush the teeth five times daily now and then given by fanatics. "Why teach using gauze on the finger and boric acid or salt solution daily to wash the mouth of an infant which is correctly fed and in good health, when clinical experience shows that it does more harm than good?" he asked, and he recommended that attention be directed to diet and to early dental

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examinations as the only means of banishing dental caries from the earth.

However, suppose you get up a product called Ora-Noid, charge \$2 for it, declare that it is "applicable to the treatment of pyorrhea at any stage of progress," and then break out in a verbal perspiration like this:

Ora-Noid, when dissolved in the saliva or blood, forms a hypertonic solution of the salts of sodium, potassium, calcium and magnesium, based on the electro-chemical theory of hydrogen ion control. While the metallic salts in Ora-Noid are introduced into the saliva in a crystalline state, they soon unite with the blood and saliva and change to a colloidal state.

This sounds sufficiently impressive to induce a state of belief resulting in the expenditure of \$2 for 10 cents worth of table salt, baking soda, chalk, magnesia, borax, and starch,—which is what people purchased when they bought Ora-Noid. In that system of belief called science this statement would have no standing, as it is meaningless. However the public can spend over \$60,000,000 annually for dentifrices of sorts so why bother about unscientific claims in a profit economy? As a matter of fact the pH, or hydrogen-ion level, of the saliva is maintained regardless of the material introduced into it. The saliva is often slightly acid in so-called normal people, and mouth acidity or alkalinity cannot be controlled by using dentifrices,—nor does the spectacular litmus test of Sem-a-for and other similar products have any definite pathological meaning.

Furthermore, if you have yellow teeth you have yellow

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teeth. They cannot be whitened other than by the use of corrosive substances like hydrochloric acid, which poisons many manufacturers have actually incorporated in their products. Tartaroff, "the greatest scientific discovery of the age, which transforms teeth immediately into gems of pearl-like beauty," was found by the American Dental Association to consist of hydrochloric acid and water, with a trace of aluminum. Even the tooth-whitening claims of Ipana, Pepsodent, and Pebecco are scientifically invalid. As to antiseptic value—Dr. Veader Leonard examined 41 brands of toothpaste at Johns Hopkins University. Eight of these account for 90 per cent of our toothpaste sales. Yet not one single preparation would destroy common staphylococcus organisms from the mouth in five minutes of uninterrupted contact.

Fortunately, if you have yellow teeth, or teeth stained with tartar, you may remember that such discolorations do not cause or even accompany tooth decay. Gingivitis, or inflamed gums, is related in only a very slight degree with uncorrected tooth decay, and having deciduous teeth filled has no apparent effect upon the subsequent or contemporary decay of permanent teeth. So declares the American Child Health Association.

On the other hand nutrition and tooth structure are closely related. H. C. Pickerill studied the skulls of the ancient Maoris in New Zealand and found that only 1.2 per cent of them had decayed teeth. The chief medical officer of New Zealand stated in his report for 1929 that perfect sets of secondary teeth were found in 172 per

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1,000 Maori school children as against 51 per 1,000 among white children. Furthermore, the more the Maori copies the white man's diet the more his dental superiority tends to vanish.

Yet Professor H. C. Sherman of Columbia University rightly warns us that commercial vitamin advertising is loaded with half-truths. Many so-called "vitamin-rich" foods are grossly lacking in vitamins A, C, and G though they contain ample of vitamins B, E, and D. The advertiser quite naturally stresses the high content of his product in the single vitamin, or in the two or three vitamins which abound therein, and seeks to create the impression that it will keep the consumer in a buoyant state of health. This may be good business but it is very poor science.

At the University of Michigan Dr. Russell W. Bunting and his associates have done excellent work on tooth decay which they also found could not be averted by the regular use of either antiseptic mouth washes or tooth-pastes. While they declared that the cause of dental caries remained shrouded in mystery, since only a mass of mutually conflicting and diametrically opposed theories of causation exist, they felt that *Bacillus acidophilus* had a great deal to do with tooth decay. By prescribing well-balanced, well-fortified, adequate rations, in which sugar was reduced to a minimum, they succeeded in preventing the spread of tooth decay in a group of children and, apparently, in preventing the formation of new cavities. The control group of children which remained on a

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regular diet, but used mouth washes of hexylresorcinol daily, quite generally developed extensive dental caries. Pastes were as ineffective as mouth washes in preventing decay. Of course, it must be remembered that Bunting's *Bacillus acidophilus* theory is not generally accepted; his work, none the less, is not lacking in suggestive value.

In fact, I could confute Bunting at once by recording Howe's assertion that a decrease of carbohydrates in the diet does not affect dental decay favorably. Howe is also a distinguished and respected investigator. He found that monkeys developed caries worst when fed a diet consisting largely of cereal and gelatin. Excess starches and sugars had no deleterious effect, while a diet of milk, vegetables, and fruits was ideal for perfect tooth formation. Lack of vitamins C and D he also held to be detrimental to the teeth. He found acid bacteria in all tooth cavities, yet discovered a high immunity to decay in many cases, regardless of acid forming bacteria. He cited the Arabs and Bulgarians who drank soured milk containing *Bacillus acidophilus* in enormous quantities and escaped dental decay, and he held that swine and other animals which eat highly acid food had good teeth. Certainly Howe could not be impressed with Bunting's *Bacillus acidophilus* theory of dental causation.

In 1924 John Albert Marshall said: "An historical resume of the etiology of dental caries presents at least one interesting fact; namely, more has been written and less is known of this disease than any other dental lesion." This stands essentially unaltered today except for the fact

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that the literature is full of many new and contradictory papers on the subject. Certain anatomical or structural defects in the teeth seem to predispose some individuals to dental caries. Most appliances installed to straighten the teeth are of the devil and promote dental decay. Mouth acidity is very difficult to determine accurately, and the reaction varies so much in the same "normal" individual that little of moment can be said about it. "Bacteria are not the only factors concerned in dental caries. It is known that *B. acidophilus* is demonstrable in every mouth without regard to the presence or absence of caries." The ductless glands certainly have something to do with producing sound tooth structure, but just what we do not know. Finally, diet has a great deal to do with successful tooth formation—but exactly what and how?

Let me call some specific and more recent workers to testify on the various points Marshall so admirably summarized in 1924. In 1931 Hanke wrote, "Many mouths become quite healthy even though the oral hygiene is poor or nil. Bacteria are, of course, a potent factor while the tissue is unhealthy; but healthy gingival tissue appears to remain healthy in some cases in spite of bacteria." Later that year Prof. T. D. Beckwith wrote: "It is probable that there is a bacterial etiological factor in dental caries. . . . A certain degree of hydrogen ion concentration is necessary in order to break down human teeth by solution. These organisms produce this appropriate degree of hydrogen potential. Likewise they can dissolve the calcareous structure of dead teeth." That litters

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the paragraph fairly well with contradiction. Suppose we try another.

In *Good Housekeeping* for April, 1930, Dr. Walter H. Eddy announced that, whereas most dentifrices are strongly recommended today on the theory that acids cause tooth decay, this 40-year old idea is not scientifically sound because the "normal" saliva is alkaline, thus neutralizing the acids, and furthermore because dilute acids could not attack teeth made out of calcium phosphate anyway, and that is what we seem to make our teeth from. I pause here in reverent silence for two minutes merely to remark that Catherine Hackett quotes the American Dental Association saying, "The saliva is normally slightly acid, therefore not alkaline, surely." Passing on let Dr. Eddy conclude to the effect that food rich in lime and vitamins C and D is needed for good tooth formation. Which reminds me that Marshall quotes McCollum as finding a diet deficient in protein, calcium, and fat-soluble vitamin A capable of causing caries. I cannot think now just what to do about these vitamin contradictions, so let us hurry on, preferably in another new paragraph.

I revert to Hanke who says:

The acid, or, let us say, the bacterial theory of decay fails to explain some things. It is true that bacteria are always present in carious dentine or enamel; but this is not surprising in view of the fact that saliva contains from five million to fifty million bacteria per cubic centimeter. This certainly does not prove that the bacteria are primarily responsible for the caries. It is

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also true that blue litmus paper turns red when it is held, for some time, in contact with carious dentine; but litmus changes color with a pH of 7.0 and this indicator will turn red if it is placed in contact with most gingival tissue. No one has, to my knowledge, ever demonstrated that decaying dentine contains sufficient acidity to disintegrate the tooth structure.

He then affirms that starch particles caught in tooth crevices could not long remain in the mouth because they are soon broken down into maltose and dextrin which soluble products rapidly pass down the gullet. He also calls attention to the fact that of two teeth that stand side by side, obviously under the same conditions of exposure to sugars and to bacteria, one will repeatedly decay and the other not. Finally, "It is also well known that the most scrupulous care of the oral cavity is no insurance against dental caries." We seem a long way from any creedal doctrine to the effect that this, or even THIS, will stop your tooth decay.

In 1929, however, Boyd, Drain, and Nelson tried to control dental caries in a group of nondiabetic children by feeding them a generally adequate diet. These children all had extensive caries to start with and did not use toothbrushes. A control group lived under conditions approximating their usual home life and diet. Mouth acidity was found to be of minor importance because, though a lessened acid production should follow lessened caries, this did not prove to be the case. No one food component was to be found specific in maintaining dental integrity, but a general adequacy of the diet in all essen-

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tial factors appeared necessary. Disastrous results followed if any one dietary component were used in great excess, this probably being the explanation of bad teeth when associated with excessive sugar consumption. Dental caries was repeatedly arrested under widely divergent conditions of health and environment, provided the diet contained adequate protein, energy, minerals, and vitamins, and this arrest became apparent two months after dietary control began.

This work seems to confirm other work carried out on children in 1928 to discover the factors of importance in the control of dental decay. In this case also diet was found to be paramount; heredity, breast feeding, tooth-brushing, and other factors had little or no correlation with the healthy condition of the teeth. As Hanke says it is quite possible for children to have rampant caries when eating two eggs and taking two tablespoonfuls of cod liver oil daily, the important factor being not some one constituent of the diet, but a liberal ingestion of all essentials. For a child this would mean a quart of milk, one egg, a teaspoonful of cod liver oil, one ounce of butter, one orange, two or more servings of succulent vegetables, and such other fruits and foods daily as the child desires. Under such circumstances dental caries can be arrested even when the major portion of the diet consists of carbohydrates, and sugar can only be convicted of causing bad teeth when eaten to the exclusion of other essential foods.

Some foods can, it appears, even directly cause dental decay. May Mellanby has long worked with such foods

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in England. In 1930 she reported that cereals actually have a deleterious effect on calcification and so act as to destroy the teeth. The babies permitted by Dr. Clara Davis of Chicago to eat as their appetites guided them, without adult let or hindrance, and who throve so successfully for years when they did so, I also remember ate little cereal, less than 8 per cent of their diets being composed thereof. Oatmeal is the worst offender against teeth, according to Mellanby, white flour the least; standing intermediate are—maize, barley, rye, whole-meal flour, and either polished or unpolished rice. Please note that white flour is better than the whole wheat for sound tooth formation. Exercise by chewing resistant foods seemed to play little part in sound tooth structure though proper maternal feeding in the prenatal period was important. The bad effects of cereals can be decreased by the use of vitamin D in liberal quantities.

At this point I went skipping lightly forth to tussle with my luncheon brisket, buying my favorite source of press misinformation en route. Therein I found the happy naked Bond Bread boys playing outside in the sunshine, all over the page, clad in roller skates or a catcher's mit, and otherwise wearing only the depleted garb economic depression suggests. I read, "All children need plenty of sunshine vitamin-D for proper growth, strong bones and sound teeth." How much of that, then, am I to believe after the deluge of conflicting reports we have just withstood? I can at least thank God that the

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naked boys all stand with their backs to me, for what sudden shock might do to my opsomic index I have no idea.

I think it may be considered fairly certain that vitamin D is needed to grow sound teeth. Well, the newspaper advertisement next says, "Bond Bread brings them a uniform supply, and adequate for normal nutrition." All right. While the furtive applause tapers off, I refer back to Hanke where I read, "Our own experiments have shown conclusively that at least the average American child between the ages of 11 and 17 is *not* in a state of vitamin D deficiency." Furthermore Hanke asserts that May Mellanby's experiments were conducted upon children afflicted with bone and joint tuberculosis who had long been in poor health, and he rightly says, "It would be entirely fallacious to draw conclusions from these experiments that could be applied to normal children." He continues by showing that ample vitamin A, vitamin C, protein, energy foods, and minerals must be present in the diet to produce really satisfactory teeth.

However, since we have mentioned vitamin C, it should be said that it is impossible to tell just exactly what effect it has upon tooth structure. Since its lack produces scurvy and since scurvy, affecting the gums as it does, could scarcely be expected to promote tooth health, it is wise to have the diet adequate in this factor which, however, can be secured from many other foods besides oranges.

Very recently Bunting and his associates have made a new report to the American Dental Association in which

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they claim to have carried on an experiment in caries control in children for a period of one year. These children were given a varied diet, fortified by one quart of milk, and some green vegetables and fruits daily. They were given neither cod liver oil nor Viosterol (the medical trade name for irradiated ergosterol). They had no sugar on their cereals or in their beverages, very little sweetened preserves and pastries, and little or no candy. In three groups of children on adequate diets active caries was negative and old cavities were arrested in growth; in two groups on unsupervised diets caries was rapid and active in its course.

Boyd and Drain, I now rise in irritation to remind you, claim successfully to have combatted caries in children who were not diabetics by feeding them a diabetic diet, and that active caries began again whenever the diet was not used. These children were allowed sweets after their meals, though not at other times (see last paragraph); they were provided with cod liver oil, a large quantity of milk, and fresh fruits and vegetables. They were also fed unusually large amounts of fats, or of carbohydrates, in sugar form, and this caused no injury to the teeth. Quite the contrary; large, unfilled cavities in which acid-producing bacteria collected were deliberately left and yet caries did not progress. Finally, many of the children did not use toothbrushes, yet their caries was arrested.

Enough has been said now to demonstrate the verity of Hanke's assertion:

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The literature pertaining to dental pathology is a chaos of facts and fiction (the latter being the outcome of a hyperenthusiastic championship of a fixed idea) in which respect it is identical with the literature on any subject that has attracted attention for a long time. A very few facts can be culled from this maze of misinformation which give some very definite clues as to the real cause of dental disease.

The problem is one that should be attacked jointly by dentists and medical doctors. In fact, dentistry should be no less than a specialty of medicine with properly qualified practitioners. In the dental field so far there have been few and feeble attempts to correlate the experimental evidence accumulated in nutrition science with clinical observation. The dentist is predominantly a tooth mechanic with a certain digital skill, unlearned in fundamental science, careless of or indifferent to the patient's general health, and quite incapable of working effectively on a problem so complex and so alarming as dental decay. Yet the physician is in the habit of rather carelessly advising ruthless tooth extraction—extractions which not infrequently have no remedial effect, and of trusting that the dentist will somehow or other contrive to perform his function intelligently. This the dentist of today is educationally and even intellectually incapable of doing.

The causes of dental decay may be summarized as: Anatomic, bacteriologic, chemical, endocrine, and dietary, with the last at present paramount in importance. It is practically impossible here to indicate a dividing line between the practice of medicine and of dentistry, yet

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cordial cooperation between physicians and dentists for the good of the patient is so unusual as to cause astonishment when it occurs, as it does, for instance, at Columbia University dental clinic. In this survey we have at least learned that any advertisement which pretends that any product—dentifrice, mouthwash, liquid or solid—will prevent or cure dental caries may be regarded as untrue; the same goes for any advertisement recommending any particular food as the panacea for ailing gums or teeth. Beware such, and withhold belief, for scientific truth is not in them.

Meanwhile we who believe anything at all with more and more difficulty as we pass from chapter to chapter, may rejoice that in late 1931 this advertising statement about a dental cream appeared in an issue of *The American Mercury*: "Squibb's is as scientific, and as modern, as up-to-date dentistry." Claims followed that this was a simple, cleansing dentifrice. The old claim so long used by Squibb's toothpaste that its content of milk of magnesia, being alkaline, was a sovereign oral remedy, has disappeared. And the official blessing—"Passed by the Council of the American Dental Association"—certified these modest claims while millions of molars chattered in unholy glee. Surely that Utopian day is not far distant when some company will advertise: "Save *all* the money you now spend in dentifrices and mouthwashes; use simple household salt and soda instead, and you will soon have enough to buy a stocking factory of your very own."

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CHAPTER XI

SPINACH FOR OTHERS

AMONG the undeniable transgressions for which, I suppose, I shall some time be compelled to face the minatory acerbity of a just and somewhat irritated Heavenly Being of unknown appearance and proportions, is the criminal fact that I have been a physiological chemist charged with the study of animal nutrition. In short I once belonged to the amalgamated order of Believers in Spinach—for Other People. But though part of my punishment be reserved to make things more interesting in the hereafter, I am not altogether denied certain minor annoyances in the here and now.

For instance, I went the other day to lunch with an anemic and dyspeptic gentleman who took me to a place of acute prophylactic torment where calories and vitamins are stipulated on the bill of fare. To his obvious horror I ordered quite nonchalantly. As a matter of fact I altogether omitted spinach! To make matters worse I not only drank coffee but indulged in fried meat escorted by fried potatoes and in the total, not to say marked, absence of salad.

My companion finally looked up from his life and death struggle with roughage, vitamins and caloric limi-

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tations, ordered an asparagus omelet, bran muffins and a glass of milk and then shot me a stab of rebuke from his eyes which scorched my very soul and made me eat thereafter in humility and in shame. As we left the place he religiously bought raisins to supply him with iron and sighed dismally.

Had I been so disposed I could have adduced excellent scientific evidence to prove that fried potatoes are more digestible than boiled potatoes, that the absence of roughage and vitamins from a meal or two is not fraught with disaster, and that dried beans and peas—in fact quite a number of things, including very certainly an iron-loaded green that we impatiently push aside and will not eat, parsley—contain more iron than raisins which are, in fact, quite low in this mineral constituent. But I did not dare adduce such facts. The gentleman had a simple, almost peasant faith in his vitamins and his bran. He would have pounced upon me ferociously as a heretic. So I adopted the humble mien of a man who knew better but had strayed into sin in a moment of weakness, while at the same time professing high admiration for the believer's dietetic rectitude.

A state of depression abided with me until the afternoon mail brought a letter from a physician friend, Walter C. Alvarez of the justly famous Mayo clinic, in which he spoke with some wrath and considerable expletive refinement. A patient of his had been stricken recently with an operable intestinal cancer. He gave directions that the patient be sent to the hospital and also insisted that he

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have a semi-liquid, easily digestible diet for the days intervening before he arrived to operate.

Two days later when he arrived at his patient's bedside the physician found him desperately ill with an intestinal obstruction. Before a colostomy (it sounds horrible, and probably is, but that is what the physician called it) could be performed the patient died. At necropsy it was found that the bowel, at the point where the cancerous growth constricted it, was plugged with a large piece of lettuce stalk. The physician now investigated and found that in spite of his very strict instructions to the contrary his patient had been fed raw fruits and salads. Moreover the staff dietitian was very supercilious when he protested this and asked if he actually could be so ignorant as not to know that people must have their vitamins? In short, give them their vitamins though you kill them, was the new hospital slogan.

My rebuke for ignoring spinach sat less heavily upon me after this information. Moreover the physician continued that quite regardless of instructions it is all but impossible to have a patient denied raw fruits, salads, spinach and bran muffins in any up-to-date American hospital today. The minute the surgeon says the patient can eat, and regardless of the nature of the illness or the operation—even if upon the digestive tract—salads and raw fruits appear upon the patient's tray and he eats. Thus cucumbers appeared upon the tray of another of his patients. The gentleman trusted the hospital and ate them. He is now where cucumber salad is very probably

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not on the menu; at least nectar and ambrosia are supposed to be the customary nutrients in that sphere.

The country, hospitals and all, has gone diet mad. New beliefs knock insistently at our brains day after day. Before we weaken under their attack let me ask how much reason is there for such fanaticism? How much factual basis is there for the diet craze which not only induced my first friend to worry himself into nervous dyspepsia over vitamins and calories, but has so potently invaded the hospitals of the land that patients get all manner of indigestible food whether they should have it or not? What, in short—as very detestable people have a habit of asking me—what do you know about human nutrition? What does anybody know? What about the august creed of modern nutrition? Are doctors simply using people, even poor, “innocent” children, as guinea pigs these days?

Diet has undergone a remarkable mutation during recent years. From the time of Hippocrates even unto days remembered by many of us, sick people got gruels and soft food. The typhoid patient is well remembered who, after finding that his first “meal” consisted of a tablespoonful of oatmeal gruel demanded a postage stamp because he wanted to read a while.

Of course they sometimes went to extremes even in the past. I remember a strapping blacksmith some years ago (it obviously was some years ago if a blacksmith was concerned) who entered a hospital for an operation on a bunion. He was kept for ten days on broth, milk toast

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and gruel. The surgeon merely forgot to specify his food and he got the orthodox post-operative diet of the day. Yet his subsequent remarks on hospitals and physicians somehow lacked dignity and repose and were, in an explosive sense, rather heroic, on a small scale.

As a race we are prone to fads in belief. This is so true that it is not restricted to the man in the street. Crazes attack physicians. They afflict experimental scientists, for a dozen of them will invariably start in on a subject the minute one of them registers a minor success on that subject. In medicine, as every intelligent person knows, one fad simply follows another. We need only to mention appendicitis, neurasthenia, bad tonsils, infected teeth, intestinal autointoxication, constipation, infected gall bladder, etc., etc., to illustrate this. We all know doctors who settle down to this or that fad and pursue it to the death—of many patients.

A very few years ago human nutrition revolved around proteins, carbohydrates, and fats. Later calories were popularized and became the major craze. Later still mineral balance appeared, to be followed almost immediately by the great vitamin and roughage era from whence we have not yet emerged into what, I fervently hope, may be an epoch of commonsense in diet. Yes, let us also hope that this commonsense will be scientific and not a mere ignorant counter-fad based upon prejudice and unreason.

What, then, do we know about diet? Are doctors merely experimenting upon us and our, or at least your,

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innocent offspring? In our research laboratories busy and unkempt specialists are keeping experimental animals—from rats to cows—under ideal conditions, changing diets on them, giving them deficiencies and superfluities, observing them, weighing them—and rushing madly to print with the little fractions of truth they think they have found. Very often, alas, their rush is so precipitant that their cargo is not factual at all, but merely adds another ill-founded paper to a literature already too cluttered by far.

Why do they rush to print? For various reasons. Anxiety for priority often overrules better judgment. A mere desire for publicity may motivate them, founded, of course, upon a lurking hope for increased emolument or for a larger appropriation to the laboratory. Again scientists like laymen are prey to the power of belief and once a belief gets them firmly in its teeth it shakes all the scientific caution out of them and renders them as dogmatic as so many Swedenborgian parsons. All too rarely a scientist is motivated by an honest aspiration to help humanity and therefore to get unbiased facts to the public as rapidly as possible. This is not objectionable when the scientist is sure that he has facts, but so frequently he hasn't. In the first place, then, too many papers are published; too few papers are meditated long enough and represent sufficiently painstaking experimentation, and the scientific journals are cluttered with articles which should never have appeared in print at all.

These very highly technical papers appear in journals

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whose very names would amaze and horrify any ordinary mortal. *The Journal of Metabolic Research*, *The Journal of Biological Chemistry*, and *The Biochemical Journal* do not, therefore, usually adorn our library tables. But the articles, as they appear in such esoteric periodicals, are promptly garbled, popularized, rendered sufficiently erroneous for newspaper syndicate use, (usually in the vain effort to effect too much simplification) and the press does the rest. The same articles are also much more austere abstracted to appear in brief form in the medical journals physicians buy to throw in their wastebaskets unopened.

Emblazoned in the public press each item, however uncertainly established in reality, is liable to start a fad somewhere. Appearing with more dignity, (often with so much that the physician finds them incomprehensible) as abstracts in medical journals, these items look convincing and many doctors actually do read them and start off on raw liver fads.

After years of wandering in the wilderness of belief faddery the layman should have some commonsense preached to him. He should be brought to realize that human nutrition did not wait patiently for Funk and Hopkins and McCollum and Evans to make it a science before it operated successfully. Many races fed themselves very adequately by traditional ideas, their members lived to good old ages and died happy, before the various food constituents were identified. Other races, like the Chinese who never drink milk, have apparently adapted

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themselves very well to a low scale of nutrition and are active and quite healthy on a diet deficient in protein, calcium and vitamins. Some races are strict vegetarians, others live almost exclusively off meat or fresh blood. The Eskimo manages to subsist on what is essentially a 100 per cent animal diet (meat, fat and protein) without contracting undue constipation, high blood pressure, heart or kidney troubles.

Men right here in the United States have lived hearty and healthy lives on practically one hundred per cent meat diets. Thousands of people are unafflicted although they have only one bowel movement per week. Thousands again do not watch their acid-base balances with painful anxiety, or eat—as did the English in the time of Samuel Pepys, as his diary discloses—with striking irregularity and monumental disregard for modern rules, drink curious blends of shellac, garment cleaner and stain remover, and yet live happily and usefully.

Then the body itself is supplied with ample reserve power to take care of wide variations in diet and habit. Our hearts and lungs and muscles can do twice what we ordinarily call upon them to do. We can lose one kidney, a large portion of our liver or even, alas and alack, a very respectable fraction of our brains, and yet persist in health and in full possession of our faculties. Our organisms have remarkable powers of adjustment to neutralize excess acids or bases in our foods, or to reject deleterious substances and pass them harmlessly on their way. Our digestive system is designed to handle roughly twice as

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much digestible food as we are normally accustomed to give it. Like a good mechanical contrivance, our bodies can handle a far greater load than they are guaranteed to handle.

Turning more directly to diet a great truth that should be announced in the street-car advertisements is this: Vitamins and roughage are not inseparable. If any adult has a veritable vitamin mania, butter, milk, yeast, orange juice, lemonade, tomato juice, cod liver oil or irradiated ergosterol capsules, not to mention sunlight, are all readily available. The passion for stuffing the alimentary tract with indigestible cellular material is a very curious one. Actually no substance offers the digestive system greater resistance or gives it more work to turn into chyme than what is essentially plant bone. Surely it is laxative, just as any substance which irritates the delicate intestinal mucosa (for the intestinal lining is a delicate membrane with extraordinary properties) leads rapidly to its own expulsion.

In many instances such material, found in spinach and in bran in very large amounts, is dangerous to health. Alvarez once operated on a number of dogs and reversed the direction of a portion of their small intestine. With this abnormal gradient the dogs lived well and happy so long as their diet was liquid, but very soon after they got solid food they died and necropsy demonstrated intestinal obstruction. The reason is that solid food moves through the bowel by reason of a natural waving motion of the intestinal walls directed away from the stomach, whereas

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liquid food can travel either way with equal facility. The reverse gradient in the dog's intestine acted as a brake to this movement of solid food, impeded its passage, and the bowel was stopped.

Very many people, usually those of the constipated-nervous-digestion type, have small intestines in which this onward movement has been reversed in one gradient or section. This section operates just like the artificial gradient the dogs had. Coarse, cellular foods therefore lead to flatulence and gastric and intestinal distress, while worse disasters lurk if their bowels happen to be unduly constricted. Yet these people too fill up on bran, whereas they need soft, easily and completely digestible diets. In such manner do "Now You'll Like Bran" advertisements operate to produce beliefs that add to human misery.

When it is remembered that a person of normal size who takes light exercise gets sufficient roughage daily from one or two medium-sized slices of whole wheat bread, the craze for indigestible food is as irrational as it is profitable to certain manufacturers. Yet today when a medical clinic is held in some small city it is said that the market is as rapidly depleted of spinach as it has been of liver ever since the finding that liver is valuable in the treatment of certain specific types of anemia.

The varied diet the newer knowledge of nutrition is supposed to necessitate in hospitals, and the varied costly food specialties faddistic practitioners and surgeons require, help noticeably to increase the cost of hospitalization. A basic low residue diet, highly digestible and more

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distinguished for softness than for coarseness would not only be cheaper,—it would benefit the average patient far more than roughage. Such a diet, including lean meat, eggs, macaroni, sugars, rice, fruit juices, coffee or tea, would not be injurious either from the standpoint of vitamin deficiency during a few days or weeks in a hospital. It would be like balm to the post-operative or post-illness digestive tract in comparison with the coarse, indigestible, highly cellular rubbish a fad now compels patients to consume.

Facing vitamins directly and without flinching what do we know? We know a great deal about the effects of vitamin deprivation upon experimental animals. We know many useful things about the dangers of vitamin deficiency in feeding certain domestic animals, just as we know that a cow must not be deprived of calcium if she is to give milk and remain in health. We also know quite a great deal about the necessity for vitamins and calcium in the diet of young and growing children.

Not even scientifically inbred experimental animals, however, are mechanical in their reactions to vitamin deficiency. Whereas the biological test for the presence of vitamin D (which prevents rickets) is today regarded as almost a routine process, carefully inbred rats will vary 50 or 75 per cent in their reaction to its lack. About 25 per cent of such rats prove immune to rickets anyway, no matter how you deprive them of D. Rats as a race are immune to scurvy. Cattle do not suffer from a lack of

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vitamin B while the cat family appears to have idiosyncrasies of its own.

Human beings practically never can suffer from a lack of the reproductive vitamin E, and it is a matter of extreme difficulty to deprive experimental animals of E and of F (the lack of which stunts growth in rats) sufficiently to cause sterility or stunting. Finally, a fact that stands out prominently is this: findings true of growing rats are surprisingly often applicable to growing children, but that does not mean that they necessarily apply to adult human beings.

A gentleman not long ago repined to me: "A while back my doctor had my nephew on orange juice; then he shifted to tomato juice; then it was cod liver oil. Just recently he prescribed bananas and now it's liver. Can you tell me what on earth he thinks he is trying to do?" I solaced him by remarking that the child would soon have to accustom itself to a daily portion of blue vitriol, since copper was then the latest mineral to function as a blood regenerator in anemia,—it was insoluble iron salts, you know, then soluble iron salts, then a complex organic something or other, then vitamin E (the reproductive), then not vitamin E but iron, and then, for the moment, minute quantities of copper.

But as the gentleman displayed distinct signs of throwing himself under a street car I relented and remarked that the doctor was probably not very far wrong in any case. He said: "Thank God for that!" and he looked it. Orange juice is potent in vitamin C and prevents scurvy,

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tomato juice is in the same class, bananas ditto, and liver tends to prevent anemia which may attack growing children whose principal article of diet is milk, merely because milk is very deficient in iron. The cod liver oil, like sunlight, protects against rickets and, unlike direct sunlight, promotes normal growth. All that is pretty definite and the gentleman heroically threw away a bottle of carbolic acid he had with him and decided to face life bravely once more.

There can be no doubt that in spite of vagaries and fads very many pediatricians and not a few general practitioners are rather wisely utilizing sound dietetic knowledge in the feeding of young children. On the other hand I know of a lady whose child had an abdomen that protruded like those of the famine children we see pictured now and then, and for very much the same reason. It was stuffed too full of indigestible matter on too many occasions—in this case spinach at the doctor's order. Later a surgeon unstuffed the child which has since thrived, minus its upholstery.

But when it comes to adults and their normal vitamin needs we know little. Of course, on radically deficient diets explorers, missionaries, and the economically "underprivileged" do develop scurvy, beri beri, and other deficiency diseases, or fall easy prey to various infections. But the vital importance of vitamins to young children and to experimental animals is not duplicated in adult humans. In fact, in a rich country like ours, it is very unlikely in normal times that any considerable groups of

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adult humans are habitually on diets so deficient in vitamins as to be injurious. We can also be certain that a patient could remain on a vitamin-low diet for two or three weeks in a hospital without serious trouble. The body is a far more resistant and adjustable mechanism than diet faddists give it credit for being, and it has but recently been shown that a complete deprivation of protein for more than two months failed to undermine the subject's constitution.

While vitamin deficiencies are serious in the young, few physicians ever meet in ordinary practice conditions which they can definitely charge up to vitamin deficiency as causative. A physician at Hopkins remarks that in 15 years' practice he has never seen a patient he could declare definitely diseased because of a vitamin lack, while a colleague has attended children 10 years and has found but four cases of ophthalmia associated with a deficiency in vitamin A, yet the latter is supposed to develop very easily with such lack.

How many physicians ever encounter a case of beri beri, or of scurvy, or of xerophthalmia? Very few. Rickets, of course, is prevalent and definitely associated with a lack of vitamin D, but that does not afflict adults. It has, in fact, been shown that long deprivation of vitamin D does not affect nonpregnant, nonlactating adult humans adversely. Except in restricted communities on very restricted diets, like the Southern pellagra belt, it is probable that few physicians ever see a true case of deficiency disease.

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Of course, as the experts constantly remind us in hushed tones, many adult humans may run close to the minimum in vitamins A and B and calcium on the conventional meat, potato, gravy, whitebread, coffee, and pie ration. Some obscure nervous and gastric disorders may result from this, yet it is very doubtful whether the total amount of indisposition caused by such deficiencies is one-tenth that produced by the flurried, worried and dyspeptic health alarmists—The Amalgamated Order of Halitosis of America. Pediatricians, livestock growers, explorers, and the health authorities of overpopulated districts need to know their vitamins, and to apply their findings, but it is probable that some Nepenthe on the subject would be advisable among the great group of middlebrows. They take much greater health risks every day. I am reminded of the flapper who would drink anything said to be alcoholic but who, at mealtimes, always reminded the others very self-righteously that she never used coffee!

As a matter of fact the appetite of a healthy, normal person will almost inevitably lead him to nourish himself adequately in a country like this, where such diverse food products are so readily available. We cannot trust these appetites so blindly as Ford Maddox Ford fancied when he wrote "O Hygeia" for *Harpers* a while back, simply because they are perverted in youth. But much would be gained if our appetites were less trammled in childhood, if we were not compelled to eat so many unpalatable things merely because they were "good for us,"

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if a complete, varied and adequate diet was set before us, and we were freely permitted to plow our way through it as we desired. If necessary I can give this apparently casual notion scientific sustantiation.

Working on dogs at Yale Dr. George R. Cowgill found that they would automatically regulate their own food intake on a caloric basis, if permitted to do so. To demonstrate this he fed some dogs which had long been on a standard diet a ration of known caloric content. Then, after a time, and under precisely the same environmental conditions, he fed the same dogs a diet containing more calories. In every single case they voluntarily reduced their food intake in almost arithmetical proportion and simply refused to overload on calories which they did not need in that way of living.

That looks very much like a basic, primitive instinct at work. We may classify with that the muddled and blind search domestic animals make for food substances missing in their diet, a search which often leads dairy cows to eat dirt and results in illness and death. But in freedom it is more than probable that animals both regulated their caloric intake to comport with their exercise levels and, after experimentation, found the missing diet factors needed.

There should also be mentioned here those healthy babies Dr. Clara M. Davis of Chicago has permitted now for some years to choose the kind and quantity of food they wished to eat from a carefully balanced selection of natural, unsophisticated foods offered them on trays. The

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dietary gorges and jags of these infants and their peculiar selections of foods are of great interest, but quite as important is the point that all 14 of them manage actually to select balanced and complete rations. Furthermore, they do this guided alone by their appetites and unaided by doctor, nurse, or attendants. Finally, they have in no case suffered from the digestive and intestinal disturbances usually so common among infants.

From his experiments and observations indeed Doctor Cowgill also reaches the conclusion that the baby, not the doctor, knows best about its diet. If its diet is adequate and complete the baby may safely be permitted to use its appetite as a guide. This is far better than stuffing it at regular intervals with known quantities of food in accordance with some doctor's or book's instructions intended to apply to an "average" baby which is as nonexistent as the famous "economic man." Such work sounds a pleasant note of sanity in diet; it portends the return to common sense guided by scientific findings and the knell of fanaticism.

The basic thing about all this diet business is our biological heritage. Over and over again nature triumphs over nurture. Discussing longevity in Washington some years ago Dr. Charles Mayo reflected the wisdom of Oliver Wendell Holmes when he said that the greatest factor was the choice of long lived parents in a healthy line. This same factor rules our reaction to diseases, to debilitations, to fatigue, to all environmental factors and to what we eat.

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An infection in the heel is fatal to one person whereas the same germs would not even make another person ill. Worry makes one man lose weight, yet many fat people worry over their diet all the time and simply get fatter. The slightest dietetic indiscretion causes one person gastric distress; the grossest nutritional ignorance does not disturb the digestive equanimity of another the slightest bit in the world. Food which is poison or infected with deadly germs never acts the same upon all who eat it.

I revert in thought to the kind gentleman who accompanied me to lunch and who figured so desperately on the caloric content of his meal. He worried about vitamins and calories and roughage meal after meal; he did his utmost to eat exactly what he should—scientifically—and he was in chronic ill health. The chances are that if he could have forgotten all about diet he might have recovered from stomach trouble. But he may, for all I know, be a type that would ail under any circumstances.

As a whole our digestive, assimilative, and eliminative processes classify physiologically under the head of involuntary operations. Such operations, like breathing and the heartbeat, proceed far better when left to their own unconscious devices than when an effort is made to direct and to oversee them consciously. Taking forethought will not add a cubit to their effectiveness.

As to diet, a very little reflection will convince us that men as races and as individuals live surprisingly well upon the most varied foods. This should restrain us from being alarmists and should lead us to conclude that sal-

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vation cometh neither in raw foods, nor in vegetarianism, nor in fruits, vitamins, minerals nor calories—as fads. We cannot properly nourish ourselves by grabbing an ill-established theory here, a fact there, and a suggestion elsewhere and trying to piece these into a system and press them into service.

But the avoidance of fads and crazes is paramount. We should pray for strength to resist belief in the nefarious idea that a temporary and slight vitamin deficiency is of serious consequence and to stand firm against the self-righteous alarmist and extremist. Thereafter our body weight and our feelings are reputable guides. Deviations above and below our normal weight are natural suggestions demanding investigation. Digestive disturbances, headaches, feelings of heaviness, undue fatigue on moderate exertion, dullness of mind—these also are indications of maladjustment and bid us examine our nutrition and our environment critically to eliminate whatever is injurious to us. And what is injurious to or good for us is by no means the same thing as that which injures or prospers our neighbor. There heredity gets its innings.

Such rational self-experimentation would repeatedly assist people to make helpful adjustments in their way of living which visits to a physician may not alter. All due respect to them, physicians cannot know our organisms individually as well as we ourselves can learn to know them. They are hurried and they know the patient's reliance on a prescription. They are led to prescribe some

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combination of drugs whereas the patient, if he gave the matter a moment's thought, might easily discern that he was eating too much pork this summer or that he should not raid the icebox before going to bed.

That is not to say that either habit is pernicious *per se*. The point is that such habits which react injuriously upon each of us as individuals—one habit here, quite another there—account for most of the minor illnesses about which we bother busy doctors. In Plato's *Republic* we hear of people who expect some nostrum to mend their way of living but Plato continues—"They have a charming way of going on and the charming thing is that they deem him their worst enemy who tells them the truth, which is simply that, unless they give up eating and drinking and lusting and sleeping, neither drug nor cautery nor spell nor amulet nor anything will be of any avail."

Plato was right. Such people still exist. Many of them are now diet faddists. Yet calm, judicial, sober common sense and a reasonably decent heredity will do more to ensure that they have life and have it more abundantly than any number of calorie crazes or vitamin drives. Moreover, it is very probable that religious faith in the proposition that Jesus Christ appeared and performed miracles in North America hundreds of years ago is quite as rational and certainly less annoyance than belief in the scientifically unjustifiable proposition that starch and protein cannot be eaten together without producing gastric disorder.

SPINACH FOR OTHERS

Since I happened to have expert knowledge of nutrition science as a worker in laboratory research for a number of years, this chapter cannot be said to be founded specifically upon any particular references. It contains simply general information that I have accumulated personally. It may, however, interest some readers to follow up the references given below which in many ways sustain what is said:

"Raw Milk Versus Pasteurized Milk," Edit. *Journal American Medical Association*, 97 1004-5, Oct. 3, 1931, airs this controversy and shows that there is little justification for seeking to discredit the value of pasteurized milk.

Gladys A. Hartwell and V. H. Mottram, *Lancet*, Oct. 26, 1929, 894 ff., show that white bread is often preferable to and more conducive to good health than whole wheat bread.

The Food, Drug, and Insecticide Review of the U. S. Department of Agriculture for September, 1929, pg. 335, exposes the bran fad in a sound, scientific manner.

Wm. Palmer Lucas and Helen Brenton Pryor, *American Journal of the Diseases of Children*, 41 249 ff., Feb., 1931, show that children have too much milk forced upon them and that it can be eliminated from their diet without disaster; Dorothy Engelhard Land and Florence H. Bosshardt, "Nutrition of Children on a Mixed and on a Vegetable Diet," *Ibid.*, 40 285 ff., Aug., 1930, show how vegetables can easily be substituted for milk in the child's diet; Frederick F. Tisdall, T. G. H. Drake and Alan Brown, *Ibid.*, 40, Oct., 1930, announced a new and very reasonably priced cereal mixture containing all necessary vitamins and minerals.

Alfred N. Hess, *Ibid.*, 474 ff., warned against undue reliance on irradiated foods.

Walter C. Alvarez was reported as saying that deficiency diseases were rare, in the *Washington Star* of March 30, 1931.

"Self-Selection of Diet by Newly Weaned Infants," *American Journal of Diseases of Children*, 36 651 ff., Oct., 1928; and "Self-Selection of Diets, an Experiment with Infants," *The Trained Nurse and Hospital Review*, lxxxvi, May, 1931, both by Clara M. Davis, M.D., describe her remarkable and most important work; as early as 1918 Osborne and Mendel found that laboratory rats could discriminate between complete and incomplete proteins when both were offered them, *Journal of Biological Chemistry*, 35 19 ff., 1918.

The following four papers very ably and very interestingly discuss varied dietetic fads and fancies to which both laymen and physicians are addicted, and which menace the health and happiness of both chil-

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dren and adults: "Dietary Facts, Fads and Fancies," Willard J. Stone, M.D., *Journal of the American Medical Association*, 95 709 ff., Sept. 6, 1930; "Some Controverted Questions in Nutrition," John R. Murlin, Ph.D., Sc.D., *Journal of the American Dietetic Association*, 6 299 ff., March, 1931; "Dietary Facts and Fads," William C. Rose, Ph.D., *Industrial and Engineering Chemistry*, 23 711 ff., June, 1931; "The Menace of Psychiatry," Joseph Brennemann, M.D., *American Journal of Diseases of Children*, 42 376 ff., August, 1931.

Hutchinson in his *Elements of Medical Treatment* says, "In that wholemeal bread contains the cell membranes of the bran, it has . . . a distinctly laxative action. Its value in this respect is no greater or less than that of any other laxative material, and there is no reason why those who prefer to eat white bread and use other laxatives should not do so." E. Mellanby has demonstrated the existence of toxamins in wheat embryo, which occurs in whole wheat bread, and has shown that human beings develop less energy from coarse than from fine flour bread. Rubner found children very intolerant of high cellulose diets and Still, in his *Common Disorders and Diseases of Children*, says brown bread is often too irritating to the sensitive bowels of the young. Horder declares (*Lancet* ii 103, 1927) that appetite is a factor too important to be ignored and none should be forced to eat foods of unproved value if they do not like them. McCance and Lawrence (*Special Report Series No. 135* of the British Medical Research Council, 1929, pgs. 57-58) say that many more careful and unbiased experiments must be carried on upon human beings of all ages before we can advise the general use of whole wheat bread.

My thanks to the *North American Review* for permission to reprint portions of this chapter which originally appeared therein.

CHAPTER XII

THE SUN SHALL BE DARKENED

ONCE upon a time there was a biological chemist. He had rats. In fact you cannot be a biological chemist unless you have rats. The rules of the union are strict. The biological chemist was trying to make the rats sick, but he wanted them to get sick in a very particular way, otherwise he refused to be pleased with their illness. He was depriving them of all food containing vitamin D and he expected them to get rickets. But the rats thrived instead. He was puzzled for some time, for science told him he must think up a "cause" to "explain" this deviation from the rules of nutrition in which he had come to believe. Because science is a kind of magic, after all, and that is the way it operates.

Finally, the chemist decided that, since the rats happened every day to be in the light range of a mercury vapor lamp, that "explained" their immunity to rickets while they subsisted on an imperfect diet. Sure enough when he prevented the rats from getting lit up, by the lamp, they contracted rickets on the poor diet. Soon after that he found that if he merely exposed the vitamin-D-free diet to the light of the lamp, it would very quickly

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acquire the properties of vitamin D, in some mysterious and it seemed quite magical way, and would then prevent rickets. Almost at the very same time another scientist in another laboratory in a distant state was doing the same sort of thing, and these two have been fighting vigorously ever since over their claim to priority in the discovery that you can irradiate foods and cause them to acquire the properties of vitamin D.

Very soon the first chemist hung his lamp over some goats and they became better goats. They gave more milk than before and the minerals in their blood increased in quantity. He hung the lamp over cows and they became better cows. The fad was well started. Science rarely produces results which appear to be so magical. The ultra violet irradiation was invisible, yet it was remarkably potent. It was very thrilling to know, not only that you could improve a goat by hanging a mercury vapor lamp over it, but that you could actually cure rickets in children, and make mothers secrete more satisfactory breast milk, by merely exposing them to the light of the magical lamp, or to the unscreened rays of the sun, for that matter. There was something to entrance the mind about this sort of thing, and people believed in a scientific proposition as perhaps they had never believed before.

The mania affected not only laymen; physicians and research scientists joined the sun dance, and tried ultra violet rays for every conceivable purpose. The magic lamps were used for practically every pathological symp-

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tom the human body produces, and every research worker who could possibly apply the rays to the substances, insects, plants, or animals with which he worked, did so at once and reported voluminously with curves and figures. The Sun-Tan Cult came into existence. The irradiation of cereals, bread, ice cream, and cigarets went on apace. Finally, a Chicago laundry volubly announced "Year 'Round Sunshine and Mountain Air," and began to apply ultra violet rays to the family wash, returning the pillowcases "sun-drenched with such healthful cleanliness." This laundry "put sunshine into the bundle when it rained," and the very medical journal that superciliously satirized the laundry's commercial antics, itself repeatedly carried advertisements of the fairy lamps which declared them to be "Scientific and Impressive!" (if not really useful) in the physician's office. I, being at the time a biological chemist, naturally hastened to believe in this new gospel. But suppose we analyze this belief a little and see just what it is all about.

As usual my none too discriminating urge to believe has just been in danger of dire advertising seduction. In the daily press during October, 1931, I saw a mother facing a naked boy on a velocipede, and it was said that if he played thus all day he would not need vitamin D. For "Sunshine Vitamin-D is Nature's first lieutenant in building straight strong bones, and sound even teeth—in strengthening resistance to colds and illness." The child can get this vitamin in Bond Bread, for its impressive seal says, "This bread brings you the extra sunshine

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vitamin-D you need." The whole advertisement was impressively certified by the American Medical Association Committee on Foods, the Wisconsin Alumni Research Foundation, Good Housekeeping Bureau of Foods, the Physical Institute, the Pædiatrics Research Foundation, Child Health Magazine, Parents' Magazine, and the Home-Making Center. Where the Amalgamated Order of Do-You-Believe was at the time I confess I have no idea. But knowing as I did first that vitamin A, not vitamin D, helps to protect us from infectious colds and illnesses, and that irradiating a food produces no vitamin A in it; secondly, that there is no conclusive evidence to show that nonpregnant, nonlactating adult human beings need vitamin D, nor much to show that many children normally lack it seriously; and, thirdly, that one could not be certain that irradiated bread would always give children all "the extra sunshine vitamin D they need," I went away sorrowful and gnashed my teeth—both of them—in some petulance.

I have intimated how all this furor began. It was in September, 1924, that Kugelmass and McQuarrie discovered that cod liver oil and other substances curative of rickets were radioactive. Also in 1924 Dr. Alfred F. Hess (on June 7) reported to the American Pediatric Society that oils, flour, and other foods could be rendered antirachitic by exposing them to ultra violet rays; this meant that they somehow acquired vitamin D. In September of that same year Steenbock of Wisconsin put in a similar claim. Fortunately for the Wisconsin Alumni

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Research Foundation, he next dashed in and patented his findings, and has since endeavored to establish the priority of his claims over those of Hess. My sympathies are with Hess, probably because he has not shown a rabid commercial spirit. But we may leave the scientists, surrounded by cohorts of their best rats, to fight the question out among themselves.

Or I may say that in 1889 William Huntly stated that sunlight would counterbalance the evils of filth and dirt surrounding the natives of Rajputana, and that in the same year Finsen declared that both solar and carbon arc radiations affected lupus, an eruptive facial disease, favorably. In 1890 the English physician, Palm, attempted to show that rickets became more prevalent where sunlight was less available, and Raczyński in 1912 proved that the rays of the sun would prevent or cure rickets in puppies. Finally, in 1919 Hulschinsky announced that he could cure rickets in children by means of solar or of artificial radiations, and thereafter mania broke loose.

In 1928 the *Journal of the American Medical Association* (90 118-9) declared that incandescent lamps, colored purple, were being used by barbers to cure baldness. Electrical corporations were selling all sorts of unscientific ultra violet contraptions, most of which were quite as efficacious as the work of the primitive medicine man—at least neither produced any ultra violet rays. Bath institutes, osteopathic chambers, swimming pools, chiropractic seance parlors, massage emporia, beauty shops, and aristocratic clubs were equipped with the modern Alad-

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din's lamps, and with glasses guaranteed to transmit the vital rays in sunlight. All and sundry were besought to subject themselves to this new medicament, yet the rays are dangerous to the eyes, they are bad for people with certain types of skin pigmentation, the fevered react poorly, the rays are contraindicated for menstruating women or for people with incipient tuberculosis, and they may easily produce serious symptoms in many who would be adjudged normal by the average doctor. The medical association's reprise—"take the advice of a competent physician"—is of little assistance here, for few physicians have mastered the necessary physics and biology to be competent in this difficult sphere.

Not that this is the first light mania. Between 1870 and 1880 a blue-glass craze pervaded the United States and it was held that all glasses colored blue or violet transmitted light rays of mystic therapeutic power. General A. J. Pleasonton experimented by growing grapes under violet glass as early as 1861, and in 1869 was trying the effect of colored lights upon the growth of pigs. He read a paper before the Philadelphia Society for Promoting Agriculture in 1871 which attracted widespread attention, and later published his *Blue and Red Light; or Light and Its Rays as Medicine*, patriotically printed in blue letters on white paper bordered in red. Herein he sought "not only to prove that the gentle Blue ray has curative properties for some disorders, and the strong, Red ray for others, but to demonstrate just why they, and not the Green or Yellow, must be employed,

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and how they act, and then to explain the best methods of employing them." In no time at all nude citizens of sufficient wealth were being driven abroad in carefully curtained blue-glass topped carriages in which they sunned themselves thanking Heaven, I suppose, that sky-scrapers were then far less prevalent than they are now.

Light, I should perhaps say, since it seems time for me to grow edifying again, is not all visible. The visible spectrum begins at a wave length of 3,700 Ångstrom units and runs to 7,700, the Ångstrom being, if you simply must know, 0.0000001 millimeter. The short waves up to 2,000 units in length are mainly of scientific interest but are known to be dangerous playfellows; from 2,000 to 3,000 units the rays are bactericidal, the germ-killing power being strongest in those between 2,380 and 2,490. The magic health rays occur between 2,800 and 3,700 Ångstrom units; these rays will cause skin pigmentation between 2,800 and 3,300, though only those between 2,890 and 3,130 are supposed to produce vitamin D in the human body by their action upon the fat, ergosterol. Hence may rays can pigment which are not therapeutic. Hence also a fine coat of tan by no means attests that one has undergone healthful irradiation. Lamps differ markedly from sunlight as it reaches us through the atmosphere, because the atmosphere filters all the short, dangerous rays out of the sunlight; lamps, indeed, will often produce dangerous rays as short as 1,800 units in length.

About rickets I must, however, speak somewhat cir-

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cumspectly. Some work recently reported in *Science* (August 16, 1929, to be exact) indicates that the light from an ordinary 75-Watt Mazda bulb will increase the ash content of the femur bones in rats. The ultra violet production of such a lamp is, it may be said, very small. In view of this, and of the further fact that sunshine is more effective antirachitically than rays from any lamp, it is suggested that the longer wavelengths perhaps possess therapeutic power. A few months later Ethel Luce Clausen reported in the *Journal of Nutrition* (November, 1929) that 10 minutes daily exposure to the infra-red irradiation from a carbon arc lamp stimulates growth in rachitic rats and prolongs their life, even if they are kept on an inadequate diet; it would not, however, prevent them from contracting rickets. This is of interest because the jovial and epigrammatic Dr. Morris Fishbein has declared certain infra-red contraptions to be no more effective therapeutically than bath room heaters. It simply goes to show that we can scarcely be too careful what we elect to believe.

Certainly little sufferers from rickets, however, have some cause to dance nude in the sun, and a marked increase in the sun's power occurs when it is at an altitude of 35 degrees or more. Rickets also is uncommon, or occurs in a mild form, where the minimum seasonal altitude of the sun does not fall below 35 degrees, while severe forms of the disease are encountered usually where the reverse is true. "The period of the year during which rickets will probably develop can be calculated for any

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city in the world. The duration of this period may be altered, however, by the prevention of exposure of patients to highly effective sunshine on account of inclement spring weather or other factors."

However, the fact that ultra violet rays do specifically cure rickets is not sufficient to sustain the more extraordinary orgies of the sun cult. One physician, Dr. Charles F. Pabst, chief dermatologist at Greenport Hospital in Brooklyn, holds that certain people are "helio-phobes" and hence unduly sensitive to the sun's rays. He has little good to say of the fashionable bronzing undergone by the health fanatics, and believes that "every year two hundred thousand working days are lost because of illness due to sunburn, which represents an annual loss of \$1,400,000." Worse still the majority of the sunburn, which can be even fatal in its effects, "is deliberately and intentionally acquired."

Blondes and brunettes, of course, tan differently. If you refuse to believe that I shall get supercilious and tell you that blondes carry but scanty amounts of the pigment, melanin, and that the more of this you have in your skin the less susceptible you are to harm from the sun's rays. Suppose you consider yourself informed about that anyway. When this pigment develops unevenly it produces freckles and, as you doubtless know, the only way to get rid of freckles is to run very fast, stop very suddenly, and then back out from behind them. Pabst declares that the sun's rays, especially when showered upon young children, easily set up an inflammation

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of the optic nerve causing blindness, while blisters and internal disturbances attack adults who persist in exposing more than half their bodies to the rays at one time. The fad of sun baking is undoubtedly more harmful than beneficial to the enthusiasts who lie in the mystic rays, and young children in sun suits not only get too much sun but may become afflicted with pyelitis as well which, as you may know (I don't) is nothing to acquire nonchalantly.

Speaking of children, Dr. Dora Colebrook of London brought consternation to dealers in ultra violet ray apparatus by reporting in 1929 that no beneficial results were observed when children were exposed to the rays. Heights, weights, and spirits remained unaltered, though susceptibility to colds was actually increased among the children who had the ray treatment. While the rays were specifically beneficial in cases of rickets, she felt that the administration of irradiated ergosterol would accomplish that result quite as well if not better. This announcement quite naturally threw the British Ultra-Violet and Allied Trade Association into a violent ferment, and "more carefully controlled" experiments, designed, I presume, to prove what the manufacturers desired to have proved, were indignantly demanded.

They were forthcoming, of course. For in 1931 Sir Leonard Hill and Alan R. Laurie rebuked Dr. Colebrook in no uncertain terms, asserting that she used slum children as her experimental animals, and that they were probably overdosed, as they were quite long in the rays

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of powerful lamps. Finally, her sunlight controls lived in a smoke-laden atmosphere where natural ultra violet rays would be at minimum. Hill and Laurie reported spectacular gains in weight and in general health, "too great to be explained by chance," when their child subjects were irradiated. Upon examination, however, the actual average weight gains differed by only half a pound between the control children which got no treatment, and the group most effectively treated. At any rate the conclusions of this work seemed mildly to vindicate manufacturer's claims that the rays have some general health value.

Yet I should like to say that C. W. Anderson reported in the *British Medical Officer* of May 16, 1931, that the use of glasses permeable to ultra violet rays "produced no significant effect on the physical or temperamental condition of the children exposed to them." He said that great effort was made to control nutrition, exercise, general health, permeability of the glasses to ultra violet rays, and every other possible factor that might upset the conclusions reached by this experiment.

Every week or so, as the *New Republic* noted a while back, (February 5, 1930) some new and wonderful sun lamp is foisted upon the public by electrical manufacturers in the United States. Physicians also are seduced by advertising reports and expose their patients to the new faddistic treatment. While the Medical Research Council of London was reporting that "exposure to the ultra-violet light had almost no beneficial effects, the

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control group (of children) usually showing the most advantage," that "the evidence was definitely against any favorable effect on resistance to infections as a result of the exposure to the light," and that though "the subjective impressions of the teachers and parents were in favor of the groups that had the light treatment, the value of these impressions could not be definitely stated," the American production of magic lanterns continued.

The *New Republic* commented—

It was strongly suggested that children suffered a bad effect when kept indoors to take the lamp treatment, instead of using the same amount of time to go out-of-doors and play! . . . Certainly, in a reasonable civilization, people would not go on investing heavily in apparatus of this sort without having some authoritative body to find out the truth and scatter its findings far and wide.

Of course, the *New Republic*, since it is a liberal religious sheet with a regenerative message, is somewhat too indignant to preserve a sense of values. For instance this is a profitable, not a rational or a reasonable civilization, and it remains profitable to the "right" people, including the leading medical journals which accept their advertisement blah, to make and sell useless and possibly harmful ultra violet ray lamps. Again it is not easy today to say what the facts are, and to broadcast them. All we can say is, be cautious until scientific experiments by workers really trained in physics and in biology give us facts to justify our conclusions. For this, let me insist, we cannot depend upon private agencies like the Amer-

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ican Medical Association, which are in reality passing upon the merits of advertising ultimately bound to be financially profitable to them. Thus, for instance, the American Medical Association Food Council readily passed the ultra violet claims of Bond Bread which, viewed from the standpoint of strict scientific belief, are both excessive and inaccurate, however profitable pecuniarily.

Let us consider ultra-violet-ray-transmitting glasses which have been freely advertised in medical journals. Ordinary glass totally screens out these rays from sunlight. In 1927 such materials as Vitaglass, Vioray Glass, and Corning Special Glass transmitted from 25 to 50 per cent of the ultra violet rays in direct sunlight, while mere skyshine through such windows produced negligible results. At that time the "use of special glass in winter" was said to be "of little value." In 1928 it was reported by Goodman and Anderson that some "special" glasses transmitted but 8 per cent of the rays; Corex, which was not commercially available, transmitted 69.6 per cent, Vitaglass from 42.2 to 48.7 per cent, and Celloglass from 21.1 to only 36.1 per cent at best. The measurements were made with great care, and no evidence was found to sustain the idea that the use of such glass substitutes was health-producing. Yet, remember, medical journals everywhere were pounding away at the production of a powerful belief in the benefit of such glasses, and implanting this belief in the minds of laymen, via "com-

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petent" physicians, who read the advertising in their medical journals, and thought it credible.

In *Science* for August 17, 1928, Dr. Janet H. Clark of Johns Hopkins reported that, while the best glass substitutes transmitted from 50 to 60 per cent of the magic rays when new, their transmission percentage fell rapidly to only 30 per cent, and that the direct sun, coming through such a medium for 3 hours, would only produce the effect that unscreened sunlight could produce in less than one hour. However, such glass substitutes were being sold with medical benediction for installation in offices and in schools. Yet during exposure to such light in a seventh floor room only $1/120$ of the sun's ultra violet rays could reach the victim when he was at a distance of 5 meters from the windows, while a child would there get as great a dosage of the rays in 20 hours as it could get in 2 minutes outdoors with the sun overhead. Consequently, a stenographer during a 15-minute walk in the sun at noon would acquire more ultra violet rays than she could by staying all day in a specially glazed office.

The same journal, *Science*, of October 11, 1929, reported work by Dr. W. W. Coblentz, physicist at the United States Bureau of Standards, which indicated that a child with rickets would have to have 5 to 7 hours exposure daily to light coming through the average special glass, while even then the rays would be only preventive and not curative. He believed that the average special glass transmitted only 25 per cent of the rays, whereas

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45 to 50 per cent transmission should be an absolute minimum. At that time he found that Vitaglass transmitted 48 per cent of the rays when new and only 23 per cent after a few days exposure. The figures for Helio-glass (Vioray) were 58 and 40 per cent respectively. The glasses, Dr. Coblentz said, were of no use in winter while direct exposure to the sun in summer was preferable to their use.

Hauch and Hanke reported in *Industrial and Engineering Chemistry* for December, 1931, that, when albino rats were exposed to Chicago sunshine at street level during the month of February, and behind good commercial ultra-violet-ray-transmitting glass, they were not protected against rickets. The glasses used transmitted 30 to 52 per cent of the rays in the range between 3,000 and 3,100 Ångstrom units.

In Detroit, not long since, 27 children, ranging from 11 to 14 years of age, attended school for a year in a room glazed with ultra-violet-ray permeable glass. A second group of 36 children who sat in an ordinary classroom was used for comparison. Each child was given a health score covering its general physical condition. The average score for the children in the room glazed with Vitaglass was 82.1 and that for those in the room glazed with ordinary glass was 82.6. The difference is negligible. Hence it was not found that the physical condition of children attending school in rooms glazed with Vitaglass was perceptibly improved over that of children who occupied rooms glazed with ordinary glass.

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The glass manufacturers are not, however, totally without defenders. In fact, the *Journal of the American Medical Association* for June 22, 1929, carried an article which concluded, "It is unfortunate that so much has been said about solarization that the general impression has been gained that after the glass is aged there is no therapeutic effect. This is untrue." This report, by two medical doctors who used glasses supplied by the Vitaglass Corporation, showed merely that rickets could be affected remedially in children who were exposed for 2 or 3 hours daily to the direct light of the sun coming through the glasses tested. This much had been granted by earlier workers, but the results do not show that the use of the glasses produces any marked benefit in normal adults working in offices glazed with special glasses. It should also be remembered that only about 1929 was an apparatus perfected for accurately measuring ultra-violet ray intensity.

But what can we believe about ultra-violet ray therapy in general? Various lamps have been advertised in the finest medical journals we have to remedy cardiac irregularity, hysteria, insomnia, sinus infections, bronchitis, skin disorders, asthma, pleurisy, nervous disturbances, nephritis, post-operative conditions, circulatory irregularities, eczema, erysipelas, lumbago, rheumatism, bad sprains, and other ills. Many doctors, innocently and naively believing that their journals actually do regulate the advertising they print on a basis of scientific verity, naturally try the lamps for all these varied ills, and much

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damage is done both to the health and to the pocketbooks of laymen. What are the facts? Or are there any? I believe there are at least enough to inspire some hesitancy.

Many of the lamps are impotent; many of them send out short, dangerous waves; many of them age rapidly and soon produce few if any rays of value. Ultra violet rays are specific for rickets. Visible red rays can heat the body tissues internally for short depths. Invisible heat rays have feeble powers of penetration. Such rays have some slight counter-irritant and bactericidal effects. The general therapeutic action of all the rays is uncertain, outside the domain of rickets. Ultra violet rays do not help eczema and they should not be used in cases of heart trouble, tuberculosis, nephritis, or in menstrual difficulties, and in treating the aged. Any doctor who uses the lamps other than to treat rickets, and then only under carefully standardized conditions, is simply experimenting with the health of his patients in an uncontrolled and ignorant manner. Furthermore, it has been definitely shown that the "wonderful" effects attributed to the rays by mothers, have no standing in the sphere of exact scientific truth. These facts are known to and have been stated by Dr. Morris Fishbein in the public press, yet he is editor of the medical journal which has profited so appreciably by advertising all sorts of lamps and glasses for all sorts of ills. A very great deal of work must be very carefully performed in physics and in biology, in measuring the wave lengths of transmitted

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light, and in discovering the precise effects of such rays upon various human organisms before we can speak definitely about the matter. As an editorial in the *Medical Journal and Record* of December 17, 1930, said:

The use of ultraviolet is in its infancy, not alone in medicine, but in the field of chemistry and physics. . . . There is still throughout the country a great deal of rather careless usage of ultraviolet apparatus. Many physicians have an overoptimistic attitude toward the apparatus and once it is installed, they use it conscientiously, but without checking up on it from time to time to see if it is doing the work for which it is intended. This is a serious matter for it leads to a false security. . . . We realize the difficulty that besets the path of the medical practitioner, for he is not a physicist as a rule, and he is handling materials which require for their adjustment knowledge which is usually restricted to the more specialized fields in physics.

Needless to say the journal which uttered this intelligent warning has not hesitated to accept ultra-violet ray advertisements of a most objectionable type. When it is remembered that the physiologist W. E. Dixon felt ultra violet rays should be classified with poison prescriptions like those for arsenic and strychnine, and used with as much care, one can see what danger lies here. Basic research is needed, for the doctor in active practice has not time to experiment, to determine contraindications for himself, and thus intelligently to shield his patients from possible injury. Dixon's standpoint was confirmed also by G. G. Blake in remarks to the Royal Society of Arts in London in 1928, while *Paris Medical* for April 20,

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1929, reported many serious and even fatal accidents caused directly by the use of ultra-violet ray apparatus.

A final word about colds may not go amiss. In 1929 Maughan and Smiley reached the conclusion, published in the March *American Journal of Hygiene*, that the "use of short weekly irradiations with ultraviolet light in certain cases of marked susceptibility to colds where even a 40 per cent decrease in the frequency of colds would be appreciated," seems justifiable from experimental work carried on by them. In the same journal for March, 1931, however, several workers at Johns Hopkins, among them the Janet H. Clark I mentioned earlier, concluded that the total incidence of colds for the period of treatment by carefully measured and controlled ultra violet irradiation from lamps, was actually greater in the treated than in the untreated group of experimental subjects. "Also cases of a more severe type, as evidenced by absence from duty and confinement to bed, by occurrence of fever, by productive cough, or by long duration, were just as frequent in the irradiated as in the control group."

Sometime ago in a mood of rather bitter pessimism the prophet Joel said: "The sun shall be turned into darkness, and the moon into blood." Verily the first has come to pass, and I assure you I am keeping a very watchful eye on the moon and, at the slightest sign of hemorrhage, am prepared to take action—by appointing a commission to investigate the matter. I read also, in

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the Sacred Writ, that "the unbelieving husband is sanctified by the wife, and the unbelieving wife is sanctified by the husband." This is of little value to me because my wife avers she can believe scarcely anything since she has heard me run on. I speak, of course, only from the vantage point of that intellectual system of belief called science. Given the vantage point of profitable advertising revenue, and I might come to believe, like medical editors, in the miraculous efficacy of ultra violet ray glasses and lamps. Given the vantage point of those who feel that their unrefined sensations give them proper materials from which to fashion inerrant beliefs, and I might be altogether different from what I am. At least in humility I should like to quote a few words here from Frazer's *Golden Bough* as a concluding thought:

Yet the history of thought should warn us against concluding that because the scientific theory of the world is the best that has yet been formulated, it is necessarily complete and final. We must remember that at bottom the generalizations of science or, in common parlance, the laws of nature, are merely hypotheses devised to explain that ever-shifting phantasmagoria of thought which we dignify with the high-sounding names of the world and the universe. In the last analysis magic, religion, and science are nothing but theories of thought; and as science has supplanted its predecessors, so it may hereafter be itself superseded by some more perfect hypothesis, perhaps by some totally different way of looking at phenomena—of registering the shadows on the screen—of which we in this generation can form no idea. The advance of knowledge is an infinite progression towards a goal that forever recedes.

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The Wardens of Earth, you see, are very careful that we do not understand too much, even about ultra violet rays.

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The negative results on the Detroit children will be found reported more fully in *Bulletin 1931*, No. 20, Office of Education, by Marie M. Ready and James Frederick Rogers, M.D., pg. 13.

CHAPTER XIII

BREATHE YOUR COLD AWAY

SO far our wanderings among the beliefs seem to have been productive of rather more dubiety than surety. We appear to have found little to which we can tie. I hope, of course, that I have never implied that knowledge produces gladness. It has long been said that "ignorance is bliss," and I have never been one to deny that ignorance was joyful, and that knowledge would almost certainly produce sorrow at the outset. Neither have I intended to affirm that belief in science would cure all ills. What I have been doing is very simple. I have used science as a system of measurement by means of which to evaluate other beliefs. However, you may measure a belief with the footrule of science, you may find that it is entirely too short, yet you may say, "Well, I like it and I intend to retain it. How about that?" I shall reply, "Do so. Science does not compel you to change your beliefs. It cannot. It merely assays their value,—in terms of its own constants. It is entirely your affair what you elect to believe. You may evaluate extant systems of belief in terms of Christian Science, of New Thought, of Theosophy, of Rosicrucianism, or of Communism, if you wish. I believe that in the long run

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you will suffer for it if you do that, no matter how joyful your ignorance (ignorance from the standpoint of science) happens initially to make you. But science does not coerce; it measures and presents standards. You must follow the dictates of your own judgment as to what to do thereafter."

Moreover, what you will do may depend rather upon your emotions than upon your knowledge and your beliefs anyway. Thus, for instance, my mother never permitted canned food to remain in the can after she opened it. She dumped it into a china or glass container at once to preserve it from becoming toxic. Today I know that research in home economics has repeatedly demonstrated scientifically that it is actually better to leave canned foods in the can after opening, where they start off aseptic at least, than to dump them out into a container that may already be septic. I know scientifically that no harm can come of leaving the food in the opened can. I believe that, scientifically. But I also discern that my emotions so govern me as to impel me to empty the contents of such cans into glass or china containers. My wife manages to believe in science with much greater emotional enthusiasm than I can muster, and she leaves food in the opened cans. But I will sneak around and put it in other containers, in spite of my scientific knowledge and my belief in the truth of that knowledge.

I fancy a consideration of a subject so lowly, and so homely, as the common cold will afford us considerable

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light on such problems as this. For instance, can you breathe your cold away by using Vapex, as many joyful friends and relatives of mine have done? Can you rub it away by using some such salve as Dionol, as other joyful friends and relatives claim to have done? Can you prevent catching cold or abort a cold by standing on your head and squirting antiseptics of various sorts into your nose? Indeed, what is a cold? How much of what you read about the nature, prevention, and cure of colds is really science and how much is pseudo-science? Measured in terms of true science what do we know about colds? Finally, if we possessed this skeleton of scientific information and believed in its truth, would we always act upon that belief, or would our emotions repeatedly seduce us into trying cold cures of sorts?

In my Washington Evening *Star* of October 20, 1931, I read, "Breathe your cold away—Vapex, the delightful inhalant discovered in England during the War." In the *American Druggist* of October, 1931, I read, "Big News from the Bottle-Front—New Campaign—the broadest in the history of Vapex—is now under way. . . . Here's hot news on a cold subject!" For there is going to be a 7-months heavy advertising campaign on Vapex in 156 newspapers in key cities; there will also be advertising in 14 national magazines of 27,788,329 circulation, and extended broadcasts about using Vapex to "check the spread of cold" from 10 powerful stations. "Get set for the 'cold rush' with a Vapex display," the druggist is told. You know the demand and you know that it is a "repeat

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item—you know the generous margin of profit it brings you. Lay the foundation for a whole season's sale of Vapex by displaying this delightful inhalant *now*." At the bottom of this advertisement the druggist is asked not to accept a substitute and is told, "A few drops on your handkerchief—VAPEX—Breathe your cold away." Finally, an advertisement in the *Medical Journal and Record*, (October 7, 1931) a periodical catering exclusively to physicians, informs the doctors that the "specific action" of Vapex in relieving colds occurs by contracting the congested and inflamed membrane of the nasal passages and preventing the formation of excess mucus. The very weak position of the poor consumer with newspapers, manufacturers, druggists, and doctors thus leagued against him, becomes evident.

I step back now to July 18, 1931, to consider an article in the *Journal of the American Medical Association* entitled "VAPEX—Vapors of Alcohol and Menthol as a 'Cold' Cure." Here I find that the Vapex manufacturers aver it has amazed scientists, has given instant relief for nasal affections, and is produced by Thomas Kerfoot and Co. of England. It is "Approved by *Good Housekeeping*," and has advertised in that sanctified magazine, as well as in the saintly New York *Times*—for a full page in a Sunday edition. Since it seems preposterous to assert that a drop of Vapex on a handkerchief will cure a cold, "laboratory reports" from the Pease Laboratories are brought forward by the company to sustain the advertising claims of this substance.

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This laboratory suspended silk threads impregnated with *Micrococcus aureus* and *Streptococcus hemolyticus* in jars of 5½ pints capacity, put half a bottle of Vapex in the bottom of the jar, sealed it, and kept it at room temperature. An hour's exposure did not injure the first-mentioned organism but after two hours both ceased to grow. Obviously Vapex kills germs! The whole procedure is ridiculous, of course, viewed scientifically. If such methods were used on human beings they would naturally no doubt kill both the organisms in their nasal passages, and the subjects of the experiment themselves. What this pseudo-scientific report has to do with placing a drop of Vapex on a handkerchief in order to "breathe your cold away" at least resists the impact of my mental processes.

The advertising story is, further, that Vapex was accidentally discovered by certain workers while the influenza epidemic swept Britain during the War. However, such discovery could not have been scientific, as it was not given freely to the world in the manner of science, but was kept secret, was later commercialized, and capitalized. The story is doubtless apocryphal anyway. Vapex appears to contain about 10 per cent acetone by volume and 40 per cent alcohol mixed with oils of menthol, eucalyptus and lavender. Analysis by the American Medical Association Laboratory disclosed the presence of alcohol in defiance of the Food and Drug Act, because it was not declared on the label. The *Journal* here took the Food and Drug Administration to task for taking no

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action against Vapex by reason of its undeclared alcoholic content. This charge, too, is of interest.

Dr. F. J. Schlink, who for some reason (can it be professional jealousy?) greatly dislikes the United States Food and Drug Administration, repeated the charge in an article in Vol. 1, No. 1, Nonconfidential *Consumers' Research General Bulletin* of September, 1931. The lead article herein was headed "The Consumer and His Protection by the Government. A Misrepresented Medicine, and Laxity of Federal Food and Drug Administration." Herein I read "We have reported in past bulletins a number of cases where the Federal Food and Drugs Administration has permitted most obvious and long continued violations of the act under which it operates, without serious efforts at restraint. Such violations seem to be found as frequently by unofficial organizations as by the government's own authorities. Though the analysis of the product showed the presence of large quantities of alcohol, *Vapex* carries on the trade package no declaration of the presence or amount of alcohol as required by the national Food and Drugs Act." The mistaken charge of the *Journal of the American Medical Association* was, you see, uncritically repeated, without effort to check its accuracy, by a *Bulletin* designed to give consumers accurate and scientifically reliable information regarding various manufactured products sold in the United States.*

Doctor Schlink and his *Bulletin* were in error in this as in earlier adverse criticisms of the Food and Drug

* See note at end of chapter.

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Administration. It is and had for some time been a matter of public record that 49 dozen bottles of Vapex were seized in Washington on May 19, 1930; 11 dozen cartons were seized in Baltimore on May 14, 1930, and 12 2/3 cartons were seized in Des Moines on June 20, 1930—all on this charge of undeclared alcoholic content. This was public information open to anyone who asked for it. Moreover the Food and Drug Administration had seen to it that Vapex, and other similar nostrums, cease claiming to cure influenza and serious respiratory diseases in their label declarations, or in advertising accompanying the package—which is as far as the law goes. It is extremely unfortunate that an organization with the reputed high aims and ideals of Consumer's Research, and one which could also be so valuable, nevertheless permits an unfair prejudice to interfere with its publication of unadulterated scientific facts.

To return to the American Medical Association which also criticized the Food and Drug Administration adversely without cause, their analysis disclosed that Vapex consisted of menthol, oil of lavender flowers, and alcohol. It is essentially menthol dissolved in alcohol and perfumed with lavender. We read:

Based on the American Medical Association Chemical Laboratory's analysis, the ingredients in a one-dollar bottle of Vapex should cost, at wholesale, even using tax-paid alcohol, not more than seven cents. What a noble proportion this leaves for overhead and dividends! No wonder the concern can afford to spend thousands with newspapers and magazines in the

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exploitation of this nostrum! No matter what Vapex may or may not do to germs in a closed bottle, it should be obvious to every physician that the product is for all intents and purposes merely an expensive substitute for the old-time menthol inhaler. Vapex will, in the opinion of THE JOURNAL, do no more in the way of curing nasal infections, relieving hay-fever or preventing influenza than will ordinary menthol!

There was a minor influenza epidemic in the United States in 1928-29. At that time many new remedies sprang into existence and many old ones began to claim the power to cure colds and influenza. This induced the Food and Drug Administration to discharge a Notice to the Trade and a Press Release, both dated January 16, 1929, in which the fact was brought out that "According to medical authorities there is no known drug or combination of drugs which will prevent or cure influenza. This statement reflects world wide medical experience and is generally accepted as fact. Under these circumstances the labeling of a preparation as a treatment for influenza, la grippe, or pneumonia, can only be regarded as a misbranding within the meaning of the food and drugs act, subjecting the products to seizure and the manufacturers to prosecution." Vapex cleaned up its package claims; so did other nostrums. From the standpoint of strict science the same thing could be said about colds that was said by the Administration about influenza, la grippe, and pneumonia, but it would be difficult to sustain this opinion legally, because so many orthodox physicians are unacquainted with the scientific facts and believe that

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they know the cause and cure of colds. The Administration can only act within the legal limitations which confine its activities to advertising matter on the label or distributed with the package of drugs, and within those of medical ignorance which would lead practitioners to testify against it in cases where strictly scientific knowledge contravened the practitioner's empirical beliefs.

For instance, I have been advised as no doubt you have, by what I supposed were "competent" physicians to put various antiseptics into my nose, or to gargle with antiseptics in order to prevent or cure colds. Yet work by Carroll G. Bull and G. Howard Bailey of Johns Hopkins University, published in the *American Journal of Hygiene* for March and May, 1927, definitely indicates that such procedure is not only impotent to kill pathogenic germs, but may kill the less dangerous germs while encouraging the more dangerous ones to grow more rapidly, and may actually, in the case of such things as "brilliant green," tend to produce thoracic infections which result in pneumonia, pleurisy, and pericarditis. The nasal tissues are very delicate and can easily be injured; if they are injured you become more susceptible than before to serious infections. The best of antiseptics has but a passing and very temporary germicidal effect; the most dangerous germs are rather deeply imbedded in the tissues and the antiseptic does not affect them. Mercurochrome, phenol, zinc sulphate, Di-chloramine-T, argyrol, and other such substances can be of no preventive or remedial value

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when used as many eye, ear, nose, and throat specialists—not to mention general practitioners—advise.

Antiseptic manufacturers have been known to present work purporting to show that the use of their product as a gargle or nasally decreased the number of colds suffered by certain groups of people. As a "control" group they used people who simply did not gargle or stick colored liquids in their noses. Scientifically such experiments mean nothing. Too many other factors—such as the general health, state of constitutional resistance, diet, exercise, use of stimulants, age, occupation, etc., of the subjects—have remained uncontrolled to make this sort of experiment at all reliable. It may look like science to a scientifically untutored layman. He may feel that he is scientifically convinced and that his new belief in the efficacy of the antiseptic rests on fact. But it is not science.

Suppose, however, that you prefer to buy a salve and rub your influenza or cold away? I would like to consider the plain white petrolatum (vaseline) salve called Dionol which was declared misbranded by the Food and Drug Administration in *Notice of Judgment* 16,794 issued February, 1929. It offers a very curious instance of a medical preparation which appealed first of all to physicians, which convinced many of them of its scientific justification, yet which might almost be said to have manufactured its "science" to taste as it went along. It was directed for use in local and severe inflammations, in pneumonia-influenza, in endometritis, for pelvic conges-

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tion, "throat and lung troubles," glandular swellings, obstetrical complications, inflammatory skin "troubles," and hemorrhoids. The label claims of the material were declared by the Government to be "false and fraudulent in that the article contained no ingredient or combination of ingredients capable of producing the effects claimed, and in that said statements were applied to the article knowingly and in reckless and wanton disregard of their truth or falsity, so as to represent falsely and fraudulently to purchasers thereof and create in the minds of such purchasers the impression and belief that it was effective in the diseases and conditions named."

Please note that the preparation aimed to formulate "beliefs" for its own profit. Dionol burst forth some years ago along with flamboyant booklets on what was called the "electro-pathology" of local inflammation. The body was said to generate its own "neuro-electricity" in the brain, which current could be measured as to constancy by using the Kelvin astatic galvanometer. That alone would enthrall me for half an hour. The nerves were said to conduct this "neuro-electricity" all over the body, the ganglions acting as storage batteries, and the skin as an insulator; the nerve sheaths were there to prevent drainage away of the current. But inflammations were said to impair the integrity of these sheaths, causing drainage to occur. Each cell, we were told, had a "plasmatic membrane" or "selecting layer," and its electrical condition was governed thereby. When toxins "inner-vated" this membrane the cell temperature rose, inflam-

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mation spread, and your nerve energy leaked all over the place unless you used Dionol.

This magical preparation was composed of "deionized hydrocarbons." It actually penetrated the tissues, reached down and found the nerves, coated them in lieu their broken sheaths and, thus properly insulated, they began once again to carry the "neuro-electricity" where it should go. These claims were substantiated by reference to a book called *Electro-Pathology and Therapeutics* by Arthur E. Baines, an electrical engineer. This book was prefaced by a treatise on *The Nervous System in its Relation to Neuro-Electricity*, by F. H. Bowman, D. Sc., F.R.S., M.I.E.E., F.C.S. The latter develops a quite original and extraordinary theory about nerve physiology which, as was quite natural since electrical engineers are not biologists, displayed singular disregard for and indifference to the facts and theories established by expert physiologists. Therapeutic suggestions were offered and a suitable liquid "dielectric" was advised to stop nerve leaks through broken sheaths. The manufacturers of Dionol purported to supply the required substance. To all this extraordinary hodgepodge which constitutes a mere caricature of science and of scientific method, numerous orthodox physicians in active practice gladly subscribed; they freely gave their testimonials to its truth and efficacy, and the exploitation of Dionol exclusively among members of the medical profession was successful and profitable.

What did the scientific facts happen to be? In the

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first place hydrocarbons are not ionized; it is therefore impossible to deionize them. In the second place the inflammatory condition existing in pneumonia cannot be attributed to a destruction of the myelin sheath which covers most nerve fibers. In the third place no plain petrolatum ointment could possibly penetrate the tissues deeply, seeking out cells, nerve fibers, or specific organs as required, nor could it mysteriously encapsulate the damaged nerves. That many physicians and even, perhaps, the manufacturers themselves, believed in the value of Dionol I do not doubt; that it was financially profitable is beyond contradiction. I simply aver that in that system of belief called science, its claims have no standing and that, when science is used as a measurement of its value, Dionol becomes of infinitesimal importance.

In the *New Republic* for January 30, 1929, Dr. Morris Fishbein, editor of the *Journal of the American Medical Association*, quite accurately and comprehensively gave the facts about colds and influenza. He delved somewhat into history and then outlined rational therapy in the light of the few facts we know. He advised simple home remedies. He especially castigated the "venal press" for carrying the advertisements of mouth washes, sprays, ointments, soaps, oranges, mineral waters, laxatives, cathartics, drugs, vaccines, and serums recommended to cure colds or influenza. Of course, he advised that "the person who is sick should go to bed immediately and should have the attention of a competent physician." The patient should have water bags, hot drinks, sufficient

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fresh air and sunlight, and should be kept at rest. Finally, Doctor Fishbein showed that nothing definite was known at that time about the influenza germ. Hence obviously one could neither rationally prevent nor cure a disease of which the cause was unknown.

Even while Doctor Fishbein was writing this laudable article, and while the Doctors Thompson of London were declaring there were at least a hundred kinds of cold any of which might be the parent of pneumonia, the "competent" physicians of the country were reading the *Journal* of their American Medical Association. At least Doctor Fishbein and its other officials aver that all good physicians belong to this association and, for the good of their minds, keep up with its *Journal*. I agree that the packages of unopened *Journals* freely given by doctors to every library in the country may be difficult to explain away on this hypothesis, but the hypothesis is the Association's, not mine. The point I want to emphasize is that this *Journal* edited by Doctor Fishbein was right then carrying in its advertising pages the announcements of all sorts of sprays, salves, douches, and drug products asserting that they were good for colds and influenza. In short Doctor Fishbein played, as always, a Protean role. While he assured the public that there could be no drug remedy efficacious for colds and influenza, his own *Journal's* advertising assured the "competent" physicians attending the public that such remedies existed in abundance.

There is evidence also that the physicians believed the

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advertisements and their own empirical experience rather than science. In the *American Druggist* for October, 1929, at least, I find an article entitled "With the Research Under Way, Soon There May Be NO MORE FLU!" Remembering that colds, and influenza which is often the more serious sequel to a cold, cannot be cured scientifically by drug means, I find it rather disconcerting to discover here a tremendous number of altogether different prescriptions written by physicians and compounded by pharmacists all over the country which "proved particularly efficacious in combatting the disease." I find the salicylates represented in varied forms; I find a number of different alkaline mixtures; I find codeine, cinchophen, and amidopyrine; I find eclectic and homeopathic tinctures of a delicately gentle character; I find digitalis and pergaline, expectorant powders and fever powders, aconite and belladonna, asafoetida, and spirits of camphor, cod liver oil and creosote, sulphur ointment and analgesic balm, and many others I shall not name. There were others still not named in the article.

The *Journal of the American Medical Association* for December 21, 1929, carried an editorial entitled "Experimental Studies of the Common Cold." The most positive thing said was perhaps the last sentence which read, "The various observations thus collected seem, in the words of these most recent investigators of an admittedly difficult problem, to lead rather strongly to the assumption that the type of upper respiratory tract infection under consideration is caused by a filtrable virus." On another

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page of the same issue I read a paragraph entitled "The Influenza Discovery (?)." This says:

With little if any apparent warrant, it is again announced, for at least the tenth time in five years, that the causative organism of influenza has been discovered and that it is hoped to prepare a vaccine. There is thus far little or no evidence in scientific medical literature, or even in spoken addresses, to indicate that I. S. Falk, Ph.D., and his associates have progressed any further toward the solution of this problem than have workers in other parts of the world, now or in the past. Even the staid New York *Times* succeeded in confusing antitoxins, vaccines and similar scientific terms in a manner that can be explained only by the undue haste with which the announcement was rushed to the audience. The furor is inexcusable.

Finally, for present purposes, I note the announcement, in the esteemed New York *Times* of November 7, 1930, of the fact that workers at the laboratories of Johns Hopkins had just discovered that the common cold was a transmissible infection. They had located a virus in the nasal passages of those affected with colds which virus they could grow in a laboratory tube. They hoped to develop a vaccine and also to prove that colds were caused by viruses and not by changes in the chemical condition of the body. The John Jacob Abel fund of \$150,000, given to the Chemical Foundation in honor of Doctor Abel, Professor of Pharmacology at Johns Hopkins, provides ample money to finance further study of the cold problem, and a great deal of further study is still badly needed.

Enough has been said from which to conclude some-

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thing. If I can manage to salvage just a little positive information from this discussion of pseudo-science I shall be satisfied. It may be best to turn the discussion around and to assert at once that the cause of colds and of influenza remains essentially unknown. It is a law of medical science that you cannot rationally prevent or cure a disease until you know its cause. With this much negative information at hand we may apply science to common beliefs about colds in order to evaluate them in terms of science. The following propositions logically become true on a basis of what has just been said.

1. No theory about "catching cold" can be considered scientifically true.

2. No method of preventing colds and none of curing them can be considered scientifically true.

3. Any empirical method of preventing or of curing colds may be utilized experimentally, and some of these methods, through long periods of trial and error, have doubtless been found to be more efficacious than others.

4. No manufacturer, no pseudo-scientist, and no physician—however orthodox or "competent" in Doctor Fishbein's attenuated meaning of the word—can offer a sound scientific remedy or cure for colds. This means that while you cannot breathe your cold away with Vapex or rub it away with Dionol, you are quite as unlikely to get rid of it by using some drug or nostrum recommended by a regular practitioner of medicine, even though such remedy be, as it has often been, Vapex or Dionol themselves!

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5. It is finally apparent that not only do manufacturers develop pseudo-scientific theories to account for the reputed remedial value of their products, but those in charge of our medical journals permit them to corrupt the minds of doctors with error, and thus not only perpetuate false science and empiricism, but impede the efforts of government agencies which seek to regulate drug remedies on a purely scientific basis.

NOTE

Consumers' Research is a private, nonprofit, New York institution founded by Dr. F. J. Schlink, who edits its publications, and Stuart Chase. It publishes both confidential and nonconfidential bulletins in which it purports to give to its subscribers, who pay a small annual sum for its services, reliable, unprejudiced, scientific information regarding the real quality of goods sold in the United States. This ideal greatly appealed to me. I joined enthusiastically. But during the past two or three years both Dr. Schlink himself and the publications of Consumers' Research have made so many palpably erroneous statements of fact that I have become suspicious of all material published by the organization upon which I cannot check up. I adverted to some of these errors in my *Degradation of Science* (Farrar and Rinehart), pages 90-94 and 98-99. When I wrote to Dr. Schlink about the Vapex matter which a Nonconfidential Bulletin of Consumers' Research gleefully published as evidence of laxity on the part of enforcement officials, he replied that he was unfortunately compelled to publish errors in order to ascertain the truth. I think this policy unethical in the first place; secondly, it was not necessary in the case of Vapex for the facts were a matter of easily ascertainable public record.

In the *Nation* of November 11, 1931, Dr. Schlink, for in-

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stance, sought to show that food and drug officials do not let the public know that they have no legal control over untruthful magazine, newspaper, and billboard advertising; yet Sumner H. Slichter, in his *Modern Economic Society*, Chapter xxii, page 544, quoted at length a Food and Drug Administration warning on this subject, and page viii of the Preface of this book says that Dr. Schlink himself read and criticized that chapter. Moreover, this warning is repeatedly given both over the radio and in public articles by Administration officials. Dr. Schlink in the *Nation* contended that the technical workers in the Administration uniformly failed to recommend laws obviously needed for the proper protection of the American consumer, whereas such recommendations were being made nearly twenty years ago, as reference to Secretary D. F. Houston's Annual Report dated Dec. 1, 1913, pgs. 15-18 and 59 will show, have repeatedly been made since, and the Administration's Report dated August 29, 1931, devoted three pages to such recommendations. Dr. Schlink contended that the publication of its correct formula on the label of a patent medicine would protect consumers, whereas public records show that numerous patent medicines have been prosecuted for false therapeutic claims in spite of a correct formula declaration on their labels. Dr. Schlink declared, "The American Food and Drug Administration has not even troubled to examine carefully into the question" of using minute and harmless quantities of potassium bromate in the making of yeast breads, yet such investigation was carried out in 1917 and was a matter of public record. In a *Bulletin* which emerged from Consumers' Research in late 1931 the implication was made that Department of Agriculture officials took no steps to protect consumers from poisonous arsenical spray residues on fruits, and the statement was made that hydrochloric acid washes should replace mere brushing for this purpose. As a matter of fact Department scientists devised the hydrochloric acid wash,

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got a public service patent on it, and always recommend its use. In this *Bulletin* the assumption is constantly made that the Food and Drug Administration could, by fiat, enforce a standard of tolerance for the quantity of substances like sulphur dioxide in dried fruits; yet the Administration has no such legal power and must prove in court not only that such substances are poisonous, but that foods themselves containing them may be poisonous.

The Food and Drug Administration is the organization in the Department of Agriculture charged with the enforcement of the Food and Drugs Act. Four years ago I began a meticulous study of its operations, having no initial faith in its activities whatever. For I held the common belief that the act was not enforced actively since Dr. Harvey W. Wiley left the helm. My assiduous study has so far failed, however, to trap the Administration in questionable procedures or scientifically unsound acts. I have developed great faith in the efficiency and the integrity of its personnel. I realize that it operates within the boundaries of very strict and often hampering economic and legal limitations. But it vastly interests me as a government bureau which actually uses scientific truth directly to the advantage of the consumer, and, so far, I find I can trust its integrity and wisdom further than I can those of Consumers' Research.

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Under *Notice of Judgment* 16, 221, issued September, 1929, the Food and Drug Administration declared "false and fraudulent" the advertising claims of Nozol, which was a mere petroleum oil containing menthol and camphor, colored with a red dye, but was recommended as "unequaled for" catarrh, hay fever, asthma, "general nose troubles," and influenza and also said in its advertising, "Physicians are among those loudest in their praise of Nozol for sinus trouble."

Under *Notice of Judgment* 16, 217, also issued September, 1929, the Food and Drug Administration declared "false and fraudulent" the claims of Zonite ("Inhale Active Chlorine. . . . Just from a flat dish on stove

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or radiator") that it could cure "many communicable diseases," destroy odors and germs, remedy halitosis,—not to mention dandruff, wounds, ulcerations, pimples, boils, eruptions, sinus trouble, sore throat and influenza.

The *Journal of the American Medical Association*, 97 1802-3, December 12, 1931, editorially denounced the tendency of the unscrupulous National Dairy Company to encourage consumers to believe that milk-drinking would give them sufficient vitamin A to prevent catching colds—a statement for which "there is not adequate evidence." The *Journal* then prescribed two dozen linen handkerchiefs and a few days in bed with home remedies as the only known panacea for colds.

CHAPTER XIV

HOW YOU CAN BE MORE LIKE ME

IF we could believe them, I am persuaded we should have to agree that biologists of times past were men of greater scientific resources than those living today. I think, for instance, of the Dutch investigator, Van Helmont (1577-1644), who gave a recipe for obtaining live mice by putting some grains of wheat in a container along with some old, dirty linen. In a very few days, he asserted, the mice would be generated and appear. Boerhaave in 1700 held that acids were male and that alkalis were female. Jean Rey in 1630 was compelled to argue mightily against the then prevalent notion that lead was alive—and so on.

Though some of these beliefs would today be severe strains upon our credulity, there are biological creeds held not only by laymen, but by scientists, which are in reality as remote from true science as the beliefs of these early investigators. Thus, for instance, the creed of democracy, which is held by some scientists as well as by many laymen, to the effect that all men are, in some esoteric way, equal, is in direct opposition to the scientifically established fact that living individuals differ enormously even

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as fertilized eggs, and that such gross biological inequalities can never be equated.

At the moment, however, I want to branch out a little from the more personal biological questions we have considered in previous chapters, to examine the faith of eugenics. I refer to the creedal assumption that if we but exercised the same care in breeding human beings that we do in breeding cattle we should soon have a race of supermen for our pains. Because, of course, we know so infinitely much about breeding cattle. I call this the creed of "How you can be more like me," because those who preach this creed most vociferously, quite naturally want the race merely bred "up" to the high level of its present-day "best" representatives among whom, also quite naturally, they stand foremost.

Now I should not want to be misconstrued. I do not assert that we know nothing of human breeding. For instance, we are rather certain that longevity is an inherited trait. Obesity seems to be inherited and also partially dominant. Something similar may be said for shortness of stature, for dwarfism, for certain skeletal abnormalities. The following also appear to be inherited, in case anyone wishes to inherit them or to breed themselves "up" to such a level: Incomplete development of the reproductive organs, diabetes insipidus, hematuria, cystinuria, susceptibility to cardiac and respiratory diseases (possibly), cancer (very probably, and in accord with complex rules), hemophilia (which afflicts the Spanish ex-Royal family), eye color, color blindness, certain

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abnormalities of the eye, certain types of deafness, various skin disorders, some teeth abnormalities, the quality of the central nervous system, and so forth.

Hair and skin colors tend to blend rather than to be inherited *per se*. This, by the way, disposes of the common superstition that a near-white mulatto woman married to a white man could have a black child. Baldness can possibly be inherited; males are usually afflicted and may derive the condition via long-tressed mothers. People may inherit a tendency to be psychotic, neurotic, or epileptic. But what has all this to do with intelligence? About the inheritance of that we know almost nothing. "Normal" men vary widely in capacity—so much so that we would not recognize a normal if we saw one. Probably highly efficient individuals, viewed mentally, simply happen to have inherited a preponderance of efficient genes in the eternal shuffling of the genes and chromosomes, but the point is that the inheritances we can trace are not desirable and do not tend to breed the race "up." *

It is an unfortunate fact that the self-styled "quality" magazines are not only too often indifferent to true science, but when they do venture into scientific exposition they are frequently grossly inaccurate. This is probably because the editors of most literary magazines remain essentially humanists with all their superiority to science intact and, in part, because scientists are so indifferent to humanism that they are quite content, usually, to let literary people remain in ignorance. Not only are such

* Cf. *Heredity and Human Affairs*, E. M. East.

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editors so befogged by their various and varied indoctrinations that they ordinarily cannot comprehend an exposition of any subject in the terms of the scientific attitude, but they continue to publish very inaccurate articles in their pages. It seems of interest in our present quest to analyze a specific, flagrant but typical instance of this.

During 1928 *Harpers Magazine* published a symposium on the future of the world. Knowing nothing whatever about science its editors were, of course, excellently outfitted mentally to do that. In similar manner it is also true too many "pure" scientists are willing to generalize about human problems, although they are totally ignorant of humanism—which is doubly unfortunate. The writers were discreetly anonymous, for they very well needed to be, in delivering their pronouncements. All too seldom did these comport with actual, hard-boiled scientific fact. In the April, 1928 issue some "eminent" biologist delivered himself on problems in human biology and explained how to breed "up" the human race. One of his most illuminating paragraphs follows:

By means of selective mating, which would require no more intelligence than that which is now employed in the breeding of domestic animals, feebleness of body and mind and even anti-social instincts could readily be reduced and the general average of the entire population could be raised to a level more nearly that of the best existing individuals.

In the light of this paragraph it is curious to have known Sewall Wright, one of the best genecists in the country, personally, and to be aware that he cannot yet

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make his guinea pigs perform according to the breeding rules he lays down for them. It is curious to know that the United States Bureau of Dairy Industry estimates that about two-thirds of our so carefully bred dairy sires in this country actually fail to increase the milk yield of their female progeny over that of the dams. It is likewise curious to know that the gentlemen who have studied and tabulated and tagged the genes and the chromosomes of the lowly fruit fly are still in darkness as to several of its capers and have not the intelligence to breed it true to rule or desire every time they try.

Even if breeders had mastered bulls that would have no specific import for eugenics. Men breed animals for physical points, not for mental characteristics. They do not even breed for better animals as such. Chickens are bred for increased egg-laying ability, cows for giving more milk or better beef, cats for pug noses or bow legs, dogs for hunting, pigs for larger bulk. No breeder has dared so far to announce his mission as that of uplifting the chicken, the cow, the cat, the dog, or the pig race as a whole, and other breeders would jeer at him if he were ass enough to make such an announcement.

Secondly, if human beings are to be raised to a "higher" level, what technique should we have to apply? We should have first to breed "pure" lines so that we could cross pure strains and thus get desirable results. That means incest, if plain speaking is in order. That is what Carlton did with his wheats. He first bred pure, self-fertilized lines and got some of the most fantastic mon-

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strosities that the plant world ever produced and no one of which was valuable *per se*. Then he crossed a "tall" with a "short," for instance, and kept crossing all sorts of pure types in every possible manner till he got wheats resistant to rust, which was what he set out to breed. So to breed humans "up" to any set standard we should have to go deliberately into the breeding of defectives in order to recognize and segregate them and let them die out. Then we should have to cross the monstrous "pure" strains we had produced and see what we would get in a few generations.

But who, pray, would superintend all this? What amiable despot could be given autocratic power and a life of four or five hundred years to supervise the experiment? Finally, what are "desirable" humans anyway—humans like the particular eugenicist who happens to be speaking at any given moment? God forbid! We should certainly not want a race as mentally careless as *Harpers'* "eminent" biologist.

In order to get at the basic error in that paragraph, however, we must run back before we jump. Let us first review heredity and its presumed—remember that presumed now—mechanism. It is a general rule, subject to exceptions of course, that all the cells of an individual contain identical sets of genes which are the obscure little things now assumed to transmit heredity from generation to generation. Now and then chromosomes lag (they are made up of chains of genes) or twist about each other, or some way or another lose a gene. Hence cells may come

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to differ as to gene content and heredity be changed thereby.

Just before it is ready to meet its mate a germ cell makes a division in two of a peculiar nature. Up to this time it has divided in twain in a very simple manner. But this time each chromosome (the chain of genes bearing the load of inheritance) does not separate in two, but two chromosomes of a pair lie side by side and one of the pair, not half of each chromosome as is usual, goes to the new cell. Hence this ripe egg, or sperm (male or female) contains only one-half as many chromosomes as the ordinary bodily cells and must later get the other half from the oppositely sexed mate with which it coalesces. That lost set of chromosomes is restored by the mate and the newly fertilized egg has a full set again, but one-half come from the father and one-half from the mother. Furthermore either half may come from either so that any specific character may by chance be maternal or paternal in the offspring.

Thus if an individual is "pure" for all genes, meaning by that that if of each pair of genes (forming its chromosomes) both are alike, you get something that may be expressed like this—each group of letters being regarded as a chromosome and each individual letter a gene—

abcd.....	lmn.....	qrst.....
<hr/>		
abcd.....	lmn.....	qrst.....

It may be assumed that the line separates the maternal from the paternal chromosomes in this formula and to

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simplify matters we have considered but three chromosomes. Now in case of a prefertilization division it is plain that each cell will get one chromosome of each kind and since all are alike it makes no difference which it gets. The ripe egg will have the structure, abcd.....lmn.....qrst.....

But suppose some gene (say determining colorblindness) differed, we might get a cell like this—

abcd.....	lmn.....	qrst.....
<u>aBcd.....</u>	<u>lmn.....</u>	<u>qrst.....</u>

—and it is plain that the mother and father chromosomes differed in one case. That egg may divide to give a heritage of abcd.....lmn.....qrst..... or of aBcd.....lmn.....qrst..... This makes it plain that segregation and inbreeding cannot bring out anything new on a species pure for all genes; it will breed pure always. But if it is hybrid—has germ cells of different kinds—this can be detected by proper crossing because different types of individuals will thereby arise.

Consider the Four O'clock (*Mirabilis jalapa*) which may have white or red flowers. These differ by one pair of genes. Call the white b/b and the red B/B. Cross these and you will get a b-gene from one and a B-gene from the other but the resultant flower will be pink. It is a blend. Is the gene gone? No. For there are two types of germ cells one carrying b and one B. Cross the pinks with pure whites, thus combining hybrid germ cells with germ cells carrying the b-gene only and you will get some

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b/B pink flowers but also some b/b or pure white flowers! For if you self-fertilize these pure whites they will stay white, hence the b-gene lived on unaltered in the pinks. A crossing with the red B-gene plants will accomplish the same result to show the continued potency of the B-gene in the pink flowered plants.

So if a man pure for blue eyes married a woman pure for brown eyes a hybrid child will result, though the eyes will be brown because the brown gene is "dominant" and the blue "recessive" and no blend is possible. Mate that hybrid, however, with an individual pure for blue eyes and you get one-half offspring with blue and one-half with brown eyes, again indicating the persistence of a submerged gene in a hybrid. (It seems just as well to remark here that some perfectly good biologists do not think human eye colors so simply inherited at all, but the case does for illustrative purposes.) Remember that all of us, since humanity is a fearfully hybrid race, are hauling around in us these submerged genes, ready to arise potently and form imbecile, criminal, or physically weak offspring for all we know to the contrary and that it would take generations of the deliberate breeding of defectives to free the "better" lines of humanity from such genes.

Now let us complicate things a bit and suppose a hybrid has two pairs of genes different as—

abcd.....	lmn.....	qrst.....
aBcd.....	Lmn	qrst.....

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You will then find four possible types of germ cells which we may call bl, bL, Bl and BL for short. The chromosomes of each pair can act quite independently of the chromosomes of other pairs. The new gene may be the determinant of brachydactylia (an inherited shortness of the fingers) and it is actually dominant over the normal condition. Mix this up with the eye variations above and from these two factors many variations are quite possible, yet in humans the situation is vastly more complex than that.

Just imagine what is not known to be so,—that three genes control the skin color of whites and blacks (many are really involved and no one knows how many) and call the negro $\frac{BLT}{BLT}$ and the white $\frac{blt}{blt}$. Then you can get BLT, BLt, Blt, bLT, Blt, bLt, blT and blt by crossing so that mulattoes may vary all the way from pure whites to pure negroes and the same holds for their offspring among themselves. Necessarily most of the offspring must be intermediate and some may breed true to shades of yellow as for instance the Blt/Blt group. These genes are not changed. They are all there. Crossing only reshuffles them and white potentialities may lurk in the darkest negro disdained by the ignorant Southerner.

But remember, that was only a speculative guess for purposes of exposition. Man actually derives 24 chromosomes from each parent and there are at least 16,000,000 possibilities of variation there alone not counting the fact that many people are hybrids for certain genes only and that this thus vastly increases the possibilities of variation.

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Moreover, the chromosomes do not always pair intact; they may link and cross over in the most complex ways, a gene now and then getting shuffled into an entirely new chromosome. Yet an "eminent" biologist could very easily breed "up" the human race to his idea of the best, which would probably be the idea of no one else in the world—for how can we ever come to agreement whether a Communist, a Republican, a Socialist, a Methodist, a Vegetarian, or a Bootlegger is the worst or best type?

A female has two sex chromosomes; they are both alike and are called X chromosomes. Man has two sex chromosomes but they differ and are called X and Y. Therefore XX makes a female and XY a male and the genes in the same chromosome as the X and Y are called "sex linked." Thus colorblindness is a sex-linked recessive variation; hence a woman has to have both parents colorblind before she becomes so though a man will obligingly inherit the condition from either parent. A man's X chromosome and all the genes it contains are lost to his male issue and go only to females. The mother's X and his Y combine for the male.

How large is a gene? It measures 0.06 of a micron; and that is 1/1000000 of a meter! It seems wise to add here that we have merely examined the prevalent gene theory. Other theories are held by certain reputable biologists. Some, for instance, assure us that no one gene is a determinant of anything, that genes are chemical units and that different combinations of genes (not individual genes) control heredity. Thus if one gene is lacking in

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the chain the inheritance may not take place. In that sense it is a determinant, but if it be present the absence of any other gene can cause the same failure of inheritance and so on. It would soon mire us completely to follow out many of these auxiliary theories for which there is excellent evidence adduced by reputable workers; I have merely outlined one to demonstrate the extreme complexity of the subject and the current instability of genetic hypotheses.

What sort of things do we know to be heritable among humans—musical ability, mathematical genius, liberalism, high morals, general intelligence? Not at all, for, as we saw above, they are mostly undesirable physical characteristics. For very few traits of man are yet analyzed from the standpoint of scientific heredity. The fruit fly is fairly well, but not completely, understood. But among humans we are as yet uncertain about environmental effects upon the genes though such effects may very probably in turn alter our entire organism and personality.

Furthermore genes located very close together may, for all we know, affect entirely different human characteristics, while there is also good evidence as we have seen to suggest that no particular gene may be the invariable determinant of anything but may only determine a character when it occupies a specific place in a specific chain with other specific genes present under proper environmental conditions! Finally the reactions between genes and the manner in which they actually cause inheritance are very obscure as this is uncharted territory. Inherit-

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ance is not the sum of heredity and environment but the product thereof.

Eugenics aims to improve men by altering their inheritance and by selecting "desirable" mutations, and new gene combinations. But we simply do not have the knowledge of human heredity to do this scientifically and there remains the rampant diversity of opinion as to what a desirable type is. The geneticist has not yet caught genes. Are they salts of nucleic acid plus a protein base? Who knows? No one. The nature of genes and of their interactions may form our characters, but how? We do not know. Now that it is known that gene mutations can be caused by environment, the isolation of "pure" strains even seems impracticable and illusory as an investigational method.

But let us turn to the cattle about which we are presumed to know so much. To begin with, animals have a breeder capable of supervising their matings to his own end. Men have no such breeder. Animals are bred for points, not with the idea of making them nobler and better animals. A breeder knows just about what he wants, at least if he is in the dairy business, whether he is able to secure what he wants by breeding or not. Manifestly the dairy cow *qua* cow is not a very successful animal. For ordinary bovine purposes she is really a rather grossly malformed creature—a sort of monstrosity suffering from an hypertrophy of her lacteal glands which can do her very little good personally. As the process proceeds to perfection (from the dairyman's standpoint) she becomes

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more and more an animated milk-secreting machine, but purely as a cow she is a far worse bovine than when the process began. These basic facts are so often overlooked that they should be restated in the beginning.

Turning from cows to the lowly guinea pig, it is probable that Dr. Sewall Wright knows about all that there is at present to be known concerning the genetics of this comparatively simple rodent. He has bred them all sorts of ways, backwards, forwards, crosswise, and otherwise and has incidentally secured some relatively "pure" lines which narrowly escape being monstrosities. For this fact is again overlooked. In his guinea pigs Dr. Wright sought to uncover all the "weak" genes. He did that by making brother and sister matings and by building up so-called pure lines. In such lines all sorts of potential or inherent weaknesses develop and the lines, so long as brother-sister crosses continue, breed true for their weaknesses. It might be possible, given many years, to breed a given colony of guinea pigs in such manner as to secure nothing but pure line progeny. That done the objectionable animals could be killed or permitted to die out and the valuable ones mated to secure a finer race of guinea pigs than ever existed since the world began.

You might, I say, do that with guinea pigs. It is done with corn and wheat right along. But it should be remembered that this is the only method known to biologists of accomplishing that purpose. It at once becomes apparent that it would be all but impossible to apply such a method to human beings, and to breed monstrosities deliberately

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—even if we knew the factors governing intellectual inheritance, which we do not, or had agreed upon the type of human being which is undoubtedly the best and most valuable, which we have not and probably cannot. So far we have only got far enough along to believe that you (a lowly sinner) should become more like me (a holy eugenicist speaking).

We do not know how to control the inheritance of mental and emotional factors in a horse, much less a man. Certain stallions are very refractory. But dispositions are not the product of heredity alone; they represent a sort of resultant of three forces—heredity, environment, and training, and no one knows which predominates or which factor is governed by each force. Refractory stallions are repeatedly retained for breeding purposes and the progeny, properly trained, are as frequently mild and tractable. Through its inheritance the animal obtains a certain capacity for something or other and it is the function of training and environment to develop that potentiality. What the animal or man is depends upon his training and his environment; what he may become depends upon his inheritance. In some cases the refractory disposition has been traced to bad training and probably has no breeding significance whatever. In any case the point I should like to emphasize is that no breeder today knows enough to know how to control the dominance or recession of mental and emotional traits in stallions. It is rather early to begin to assume that this can readily be done with human beings.

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Returning now to the cow who has, in her patient manner, been quietly awaiting us,—she has 37 or 38 chromosomes, depending upon whether she is a he or not. Human beings have 48. Stop and consider momentarily the enormous number of permutations you might get by alternative rearrangements of even 37 chromosomes. Then remember that each chromosome is made up of several genes and that gene rearrangements can also produce different heritages, and it will occur to you that the problem of breeding efficient dairy cows is at least somewhat complex statistically. Now it is known that many genes (not one alone) are concerned with milk production although the exact number thereof and their position in their chromosomes have not yet been determined. The inheritance of milk production therefore involves multiple factors and only a careful study of results obtained in an enormously large number of matings will enable definite conclusions to be drawn.

Furthermore it is not yet known which of the many genes that affect milk production are present in any single cow. She may have a production level of 12,000 pounds of milk annually due to a certain gene complex while another cow with an altogether different gene complex may have exactly the same milk production level! Hence it is quite possible to have a number of cows with the same level of milk production and yet each of very different genetic composition from any of the others. Let it be remembered that we are working here with a comparatively simple physical quality and not with such a

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hazy concept as high human intelligence. Some of these cows might breed true for high milk production and some might not.

Suppose, however, that a breeder has a heifer whose dam produced 10,000 pounds of milk and whose sire's dam produced 16,000 pounds. There is as yet no satisfactory means of determining with any accuracy what the production of her daughters will be. To make the attempt would be to put the cart before the horse because the only recognized method of procedure in such cases is to test the heredity of a sire by breeding him to cows which have a certain definite milk production in order to measure his transmitting ability by the milk production level of his daughters. Dairy breeders can only raise the level of milk production in purebred herds by using tested sires which transmit the genes for high milk production.

Things like milk secretion are not entirely hereditary anyway. The correlation between test and retest in individual dairy cows is only about 0.667, hence there is a very considerable variation in milk production by the same cow in different lactation periods and a breeder has to expect that a cow which produces 14,000 pounds of milk one year will vary as much as 2,000 pounds either way the next. What then is the animal's true level of milk production? Such variations are caused environmentally and have nothing whatever to do with heredity. Inheritance accounts only for the permanence in milk production of a cow from one lactation period to another

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and breeders look there for further improvement in dairy cattle. But cattle pure in inheritance for a high level of milk production remain to be bred.

In beef cattle the situation is still less understood. Little is known about the heredity of the finer points of conformation beyond the fact that it is doubtless a case of multiple factors again and the results of selection are realized still more slowly than in dairy cattle. In single matings results are frequently most disappointing, due to the inability of the breeder to detect the number and nature of all the hereditary factors carried by the individual. But selection over a long period of time gradually shifts the general character of the population in a desirable direction—again from the standpoint of the breeder, not the cattle. Finally, it is almost certain that animals having what human beings regard as very palatable flesh may be produced by intelligent forethought, and that is about all that can be said.

This survey indicates the complexity of the factors governing breeding where, according to biological enthusiasts, it has already been so “successful” that we merely need to emulate such methods in order to breed up the human race. Instead of that what have we found? Cattle breeding is endlessly complex. A great deal remains to be done. Results are as yet uncertain. Suppose we confront a human being with 48 chromosomes instead of the bovine 38. A cow must pass through a period of but three years before it becomes possible to ascertain whether a single mating has been successful or

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a failure from the standpoint of milk production. It requires 12 to 25 years to find out whether a human mating has or has not transmitted high intellectual attainments. At the outset, then, and even assuming that we knew what factors govern intelligence and what the best types of human being are, we should face a considerable chronological handicap in breeding the human race up to any desired standard. Furthermore the human race is not so tractable as the bovine and seems destined for a long time to offer more resistance to compulsory matings than the cow.

However, while something is known about the genetic character of the inheritance of milk production, practically nothing at all is known about the number of the genetic factors involved in transmitting human intelligence. If we confine our attention to intellect alone—and it must be remembered that unruly emotions can make very intellectual people most undesirable in many ways—several things might be said. For one thing ability *per se* is not supposed to be inherited; biologists of scientific standing assume that what is inherited is a capacity for learning. Secondly, there are very probably millions of people walking around with potential capacities entirely undeveloped by reason of chance environmental obstacles. Thirdly, there are many levels of human intelligence—such as the idiot, the imbecile, the moron, the low-grade normal and the normal; some may definitely be inherited—like the first three. These may probably represent fairly pure genetic types and their

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elimination from the breeding human stock seems advisable as a step in improving average human intelligence, but such a step is always and at best only a step.

For there are millions of our most respected and highly educated citizens who no doubt carry about within them a few undesirable genes and occasionally, when just a particular combination is brought together at some mating, an individual of low-grade intelligence results. Much has been written by the eugenic wing of the biologists about preserving the "intellectually superior." We are regaled with the unfortunately low birth rate among college graduates as an argument to show that we shall be overwhelmed by masses of low intelligence unless we pass a law or do something about it. Perhaps it is very desirable to reproduce our educated classes. Perhaps, again, we already educate abstractly or intellectually too many individuals who should be educated manually. Perhaps some of our present unrest is a direct result of educating the wrong kind of people with the only sort of education which we happen to have on tap in our public schools. But the further fact should not be overlooked that the college-educated class of the population has, in the past, produced, and probably will for a long time in the future produce, only a small percentage of our college students. The majority of these students come from the "uneducated" masses, and the mere fact that men and women are college-educated does not necessarily fit them to produce children of superior intelligence any better than if they had never attended college at all. For in-

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heritance probably counts more here than does environment, assuming learning capacity to be inherited.

Would it be easy, then, to breed the human race up to the level of "intelligence" of the "best" human beings of today? We do not know what the "best" human beings are. "Intelligence" is also a poorly defined term. But, assuming that we know what intelligence means, we do not know the genetic factors which control its inheritance. Some of our best people certainly carry around weak genes that might work havoc in their progeny. We do not know what genetic factors control the disposition of a horse. We do not know the genetic factors that control the milk-production level of a dairy cow, nor do breeders as yet know how to breed cows for this specific physical attribute surely and without error. We do not completely understand the simple and lowly guinea pig from a genetic standpoint although in guinea pigs and in corn (maize) we can now breed pure lines which produce amazing monstrosities but which may later be crossed to yield an animal or a plant better suited to our human needs. The conclusion therefore becomes inescapable that biologists of no matter how great prestige who claim we could easily increase the quality and intelligence of the human race by selective breeding have forgotten what they knew about agricultural science, if they ever did know anything about it, and are merely reciting a creed well impregnated with some pernicious varieties of joyful ignorance. Personally, I cannot believe them. Can you?

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REFERENCES

This chapter is based on well-checked scientific information I derived personally from scientists in the Bureaus of Dairy Industry and Animal Industry of the U. S. Department of Agriculture, rather than upon any specific references I might give. The following are also of interest in this connection: "Biology of Superiority," Raymond Pearl, *American Mercury*, Nov., 1927; "What Can We Hope from Eugenics?" H. S. Jennings, *Plain Talk*, April, 1928.

My thanks to *The Scientific American* for permission to reprint portions of this chapter which originally appeared as an article therein.

CHAPTER XV

CAN WOMEN BECOME MEN?

THE last creed that I want to consider is also biological, but it has broad social aspects. About a year ago I was asked to contribute a chapter to a book symposium on modern woman. In a moment of weakness I consented thus to abet criminally the overproduction of books of this character. I did so in part because I thought it would be useful to define sex and to bring out the facts, widely known to scientists, that the sexes differ materially, and that women can never hope to do all the things that men do simply because they can never hope to become men. I bargained without my editor, however, and forgot that he was dominated by certain emotional principles to which he held with such theological fervor that he did not intend to let scientific fact interfere with them.

This editor I just now discover advertised as a "distinguished" lecture "attraction" who has a "complete knowledge of his subjects." Actually he is fluent, witty, brilliant, and interesting, I grant. Indeed, I should not for a moment seek to interfere with his orations nor with his further production of books on misbehavior, which books go so far to illustrate that subject merely by being

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written. My sole interest in him is and was that he has no proper respect for scientific beliefs and no adequate conception of the method and value of science. I found that out over a year ago when I outlined my tentative symposium chapter and announced that I wished to state the scientific facts demonstrating that woman, if she really were effeminate, could not be man.

The editor's letter was in the best manner of the offended theologian. He reminded me that feminists of both sexes held that women were physiologically and psychologically adapted to do anything that men did; it was also a tenet of the creed of every liberal and progressive that there was little, if any, difference between the sexes. The symposium was to be "liberal" and "progressive," and it therefore could not possibly contain anything designed to deny a fundamental belief in the liberal, progressive creed. It was profane, if not sacrilegious, for me to suggest any opposition. My attitude was "weighted with prejudice" and I desired "to spill the poison of personal animosity." The mere suggestion that scientifically established facts should have a moment's consideration when a tenet of the liberal creed denied them was most repulsively offensive.

In consequence of this the great symposium on modern woman went to press with me absent. For I saw at once that I had to do with a piously religious man who held his beliefs with a fanatical fervor, and that, in so righteous a company of liberal believers, one who dispassionately adduced the truths established by science

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was an outcast indeed. However, I still have the material I gathered together at that time and shall use it in the examination of the concluding creed we shall consider—the liberal and feminist assumption that the sexes do not differ, and that women should do whatever men do because, with very little adaptive effort on their part, they can readily become men. How does this creed measure up when science is the foot-rule?

Various statements by fluent but unscientific lecturers have led me to ask two or three questions. In the first place what is sex? The dictionary chastely replies, "The sum of the peculiarities of structure and function that distinguish a male from a female organism; the character of being male or female." That gets me just about as far as the genius of *Genesis* who remarked something to the effect that male and female created He them. It certainly reminds me that I have never heard a lecturer-expert define sex. They spoke of it as an objective reality, as material as a brick, and as completely understood. Next, assuming you have sex at last where you can examine it and be sure it exists, do the sexes differ from each other, or are they as much alike as the lecturers insist?

We have said that sex is "the character of being male or female." Is this something stable and immutable? One of my friends speaks in almost ecstatic terms of woman as something eternally and forever different from himself. He mouths the word sex as if he knew all about it and as if it symbolized a permanent reality.

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I rise impertinently to remark that by mating pigeons of different genera, or families, sex reversals from female to male may easily be accomplished. By using higher temperatures (27° C.), or by "overripening" the eggs before fertilization, frogs may be diverted from their original eggish intention of becoming females, into that of becoming males, or *vice versa*. But also remember we are not frogs.

I cite likewise a precocious fowl who, in her virtuous early life was the mother of chickens, but later had her single ovary destroyed by tuberculosis and became a cock in appearance and desire. She was given a female mate and proclaimed her emancipation by becoming the father of two chickens. Oddly enough the investigator who reported this was named Crew and it took place in 1923. What is this thing called sex? As early as 1914 a ring dove ceased laying and after some months became strongly masculine in behavior; she forced her male mate to function as the female of the pair and at autopsy it was disclosed that "her" ovaries were gone for "he" had by then developed two perfect testes! Yet in both these cases a perfectly "normal" female functioning in the manner also called normal had existed earlier. Women surely have something to learn about equality with men. But we are neither chickens nor doves.

Indeed it is very easy to accomplish artificial sex reversal in hens by the mere surgical removal of their single left ovary—the right failing to develop in a hen, also "normally" shall we say? At least the right ovary of a

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hen differentiates but slightly before its development is checked and it atrophies. If the good left ovary is then removed the slightly differentiated right gland develops into a male gonad, takes the form and function of a testicle, and spermatozoa appear. So what is this thing called sex?

In the oyster sex reversal is so commonplace as scarcely to cause a social ripple. It occurs not once but repeatedly in the life of the organism. Visible changes from femaleness to maleness begin about $3\frac{1}{2}$ days after the eggs are produced and within two months the same oyster liberates sperm to fertilize its own eggs, if the temperature of the sea is propitious. If an oyster spawns late in the season it may consent to remain a male till the following spring; but if it spawns early it will shed its sperm and attain a neuter phase; in some cases it will actually again revert to the female phase in the same season. I am afraid the walrus and the carpenter failed to tell us all they discovered in their celebrated walk by the sea.

These instances of sex reversal should be regarded as movable points along a line extending from one sex to the other—and any stage along the line displays therefore only one of several attainable stages. This abstract principle also holds for human beings as well as for oysters. In 1905 Freud pointed out a variety of specific and adventitious events in development which can modify or limit the influence of heredity, and in this borderland between psychology and medicine, workers

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continually arrive at conclusions quite in harmony with the reversable nature of sexuality so prevalent biologically. Moreover, there have been reported cases of adult normal women who very closely approached masculinization until the removal of tumors, after which they became females again. Sellheim described one such case in 1925, a female with normal sex-life till age 43. Then, within a year, she became wholly masculine in appearance with a thick, heavy beard, her body, gait, voice, torso, and even genitalia all becoming quite masculine. The removal of a uterine tumor ended this detour into the other sex and within 10 months the woman became a normal female in every respect except for a slight excess of facial hair.

The bovine free martin is a naturally occurring, perhaps accidental case of parabiosis between male and female twins during their embryonic life. Among humans there are all gradations hermaphroditic, some arising as a sequel to an unusual or aberrant chromosomal equipment, others, a much larger group, being merely individuals that should be regarded as examples of incomplete sex-reversal. It is well known that a temporary feminoid tendency often appears in boys at puberty while a viriloid tendency occurs as frequently among women at the climacteric; these states are no doubt associated with a temporary unbalance of the endocrine system occurring coincidentally with sex crises.

Moreover, it has been shown that among pigeons something contained in the testis or ovary is capable of modi-

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fying specifically the sex behavior of females. Several pairs of hybrid doves have been mated female-to-female, and the relative masculinity of each member of each pair tested by recording the frequency with which it functioned as a male in its sexual behavior. When the more "masculine" member of a pair was given ovarian extract, and the more "feminine" member got testis extract, the behavior of the pair was completely reversed during the period of treatment. When the treatment stopped the original behavior pattern recurred.

Sex, then, in the sense of male and female created He them, is not the solid something certain persons would have me believe. The human organism partakes rather more of the quality of Swedenborg's mythical angels than that, and there is but one sex—male-female, like that of the oyster. Among humans sexual differentiation has, however, attained considerable proportions, is relatively stable, and its preservation is necessary to ensure social stability. Yet in theory we may regard sex merely as varied positions upon a line drawn from what we call "male" to what we call "female," and the dot may appear almost anywhere on the line in the case of a given individual; furthermore, it is even relatively labile for that individual and may move up and down the line with considerable freedom. However, when the sexes do differ, they certainly do differ much more than the liberal feminist experts ever care to admit. Their thesis is not the whole thesis, by far, and they grossly ignore those scientific facts that seem inimical to that thesis.

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In America especially the "modern" woman feels obligated to extend the symbols of her economic independence far and wide. Her "economic independence" consists in working to support herself or, quite as often, her family, and not uncommonly her husband, just as men have done for wives and families in the past. Hence everything that challenges the old doctrine of psychic sex difference is welcomed. "The most obvious differences of motivation between the sexes are calmly ignored and a whole new mythology has been evolved which deceives only the clever," writes a scientist in a journal of psychiatry. The psychological aftermath of the feminist revolt is prevalent in doctors' offices where frigid women resort after having used sex "freedom" to feed their egos. Love is sacrificed on the altar of economic ambition, and "fair-minded" men are requested to take this new he-woman at her own valuation.

Yet even among the higher primates females adjust themselves to new situations and conditions by one set of attitudes and males by another. Their behavior patterns are quite different. Human sexes tend instinctively to draw apart and to group in accordance with innate sex differences. "In industrial life as new lines of work open to women there is always a tendency for men to abandon it; the reason given is customarily economic but segregation tendencies are almost undoubtedly reasserting themselves also. Primitive communities coordinate the segregated labors of the sexes rather than seeking completely to integrate them. . . . The organized woman's

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movement would abolish all distinctions and it is possible that women may show great capacity for very hard work if they wish, but will the end be socially healthful?" The query is that of Clark Wissler.

It is, perhaps, most impolitic to express this view. Among liberals who believe in the dogmas elaborated by unaided power of native intelligence it is customary to subscribe to the theory that women can do everything that men do, and do it just as well, because there exists no fundamental difference between the sexes at all. In spite of this the scientific evidence proving the existence of such differences is quite inescapable if faced squarely. It is important to know that in striving for what are humorously called the "rights" of women—humorous, because men have not yet made such truce with our present economic and social system as to guarantee their liberties to them, or to negate their "right" to starve occasionally, through no fault of their own—women as well as men gladly work against the best interests of the feminine sex. The illuminating presumption that women are in every way equal to men makes it necessary for the Government to proceed most circumspectly when it desires to afford the specific type of industrial protection to women that their biological function demands. A section of a Government bulletin on *Health Problems of Women in Industry* must for this reason be set aside to explain the quite scholastic point that the legislative standards of work advocated should apply not "only" to women but that "they apply *especially* to women."

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Industrial conditions easily bear especially heavily upon women and they need the especial protection therefrom that men do not need. This is why a Government bulletin discusses the *Health Problems of Women in Industry*, (No. 18 of the Women's Bureau issued 1921), why another gives *Selected References on the Health of Women in Industry* (No. 71 issued 1929), and why yet another (No. 57 issued 1926) discusses *Women Workers and Industrial Poisons*. Certain actions required of workers, certain conditions of toil, certain poisonous substances used, certain types of fatigue, and certain efforts at specific times in the month, or during early pregnancy, are especially inimical to the health of women and this fact must be recognized, however offensive it be to liberal dogmatists unacquainted with the rude realities of life. The Russian Soviet Government was quick to sense the fact that men and women differed so markedly that different working conditions must be provided. So long as it remains unnecessary to allow for the menstrual period in man; so long as he does not require special prenatal attention; so long as he avoids pregnancy and eludes the throes of parturition, so long will this quaint chimera of the liberals be ridiculous in the extreme.

The pathological effect of nervous tension is different upon women from what it is upon men. Continued standing, sitting, or weight-lifting affect the feminine organism differently. "The present day is hearing a great cry that women should be given equal opportunity with men for all occupations in all industry, but even the most

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ardent of these exponents of the new creed of feminists will pause before a presentation of the case for better protection of working women based on a scientific study of the effect on their health, and that of future generations, of exploitation, long hours, low wages, and improper working conditions." So the Government bulletin defends its contentions, yet one may well doubt whether rabid feminists of both sexes care anything at all for facts which are nasty enough to contravene their sectarian doctrines and fanatical creed.

Pregnant women can suffer abortions if exposed to benzol poisoning incident to certain industrial occupations. While men show a susceptibility of 1 in 17 to lead poisoning in certain white-lead factories, the susceptibility of women is 1 in 8, or twice as great. Women dippers in British potteries had twice as high a rate as men in 1910. In 1920 women carriers in American potteries who worked with men in the dipping rooms had a toxic rate of 15 per cent, while no cases were reported among men; among dippers' helpers the rate was 8.4 per cent for men and 14.4 per cent for women. Women are also more liable to the severe forms of lead poisoning which result in unconsciousness, delirium, convulsions, and blindness.

During the war it was discovered that T.N.T. poisoning was worse among women than among men munition workers, and dinitrobenzene poisoning was far more inimical to the health of women than to that of men. In America it was observed that women in smokeless-powder

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factories suffered more from ether poisoning than did men. French statistics show that, while lead poisoning in the father may affect the offspring, lead poisoning in the mother has a far worse effect. Women who have had chronic lead poisoning often become sterile; if they become pregnant they abort or produce stillborn children; if the child is born living it often dies in the first year of life. Both carbon monoxide gas and benzol may produce abortion in women and the latter, by causing anemia, renders a healthy pregnancy almost impossible. Such evidence could be piled high. It is securely founded upon the natural physiological differences between the two sexes, but fanatics are notoriously impervious to factual evidence.

As we saw in Chapter XIV male and female organisms also differ essentially even when they are single cells. It may not be out of place to repeat in this connection what was said earlier. The female has an even number of chromosomes and the male has but a single member of one pair of chromosomes which the female cell possesses in full. This odd male chromosome is designated as X and the female has two Xs. Hence the male cell contains a certain number of chromosomes plus X and the female the same number plus 2X. With his X chromosome the male cell has paired a small, rudimentary chromosome, called Y, which is usually minute in size (and if large, it is empty), and never occurs in female cells. Since every cell in the mature organism follows the original pattern, bar environmental accidents such as we reviewed above,

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males and females are genetically different in every body cell.

Moreover the male produces two kinds of germ cells, one containing X and one not containing it, but containing instead the rudimentary Y. Female germ cells show no such divergences since there is in a female parent a pair of X chromosomes in each cell and all ova get an X. When a sperm carrying X unites with an ovum carrying X, a 2X or female organism will result; but if the sperm carrying no X, though bearing the rudimentary Y, unites with the ovum carrying X a male organism will result, bar accidents. Hence it is notable that the X of the father goes always to his daughters and never to his sons, the son always securing his X chromosome maternally, which incidentally means that our ancient systems of male inheritance lack biological basis or significance.

However, the genetic complex, whether prospectively male or female, always contains a considerable minority of genes predisposed to the formation of the opposite sex. Let that be remembered. We have discovered now that two slightly different combinations of genetic factors are formed in fertilized germ cells and *in some way* this difference in genes is continued in every body cell; that these genetic factors ultimately determine *in some way* the accessory, or secondary, sexual characteristics of the developing individual in conformity with the primary sex characters—testis and ovary. Finally, genetic combinations which seem normally destined to develop into the

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female can be forced *in some way*, or ways, to reverse, and *vice versa*.

That the female organism contains and keeps in circulation certain chemical substances that menace the male seems proven by the fact that the prenatal death rate of male embryos is higher than that of females. Furthermore male mortality of infants under 1 year of age far exceeds that of females, there being 130 to 134 males per 100 female deaths of such infants. The rates reach equality in about the fourth year of life. The male is the weaker sex, probably because exposed to inimical female chemicals *in utero*.

On the other hand the male is taller and heavier at birth though from 11 to 16 years of age females have the ascendancy here, while from 17 to maturity boys forge ahead in stature. Girls have larger trunks, less muscular legs, more adipose tissue on the hips and thighs, smaller hearts, and lesser lung capacity. Their center of gravity is lower, which places them at a disadvantage when their weight is supported by their arms. Their short legs and lesser lung capacity interfere with their speed as runners or skill at jumping; they get breathless rapidly. Their oxygen-carrying capacity is smaller than man's, both because of their smaller surface measurement and because there is less hemoglobin per corpuscle in their blood. The metabolism of girls is less than that of boys in a ratio of about 100 to 141 and this is true at each age, bulk for bulk, from the beginning of adolescence to maturity. Hence females have less ability to do arduous

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muscular work than men and also tend to be anabolic (energy storing) rather than catabolic (energy releasing) organisms like men. This energy storage, however, enables the female to stand moderate physical hardship better than men.

When it comes to tennis Helen Wills practiced against men players actually because no woman could really extend her, but not because she could beat the men. A woman could not stand the power of her attack. Years ago Lenglen failed to win a single set from Tilden and women stars are customarily lost when playing with men. Men have far greater speed in returning and delivering strokes. "A woman player is not able to start quickly enough to get many of a man's shots, whereas her strokes do not die as fast against him as would another man's." Against "the withering pace" of men Helen Wills was outclassed. "In neither speed of feet nor of strike could she even approach them," according to Allison Danzig.

The sexual difference in metabolic rates has been noted above. Certain investigators like Oscar Riddle believe there is a decided difference in the oxygen intake of male and female eggs and that sex is originally determined in part metabolically. Benedict claims that man grows cooler with age (it had been suspected before), not only mentally and emotionally, but in actual heat production, but the metabolism and consequent heat production of men and boys after 1 year of age averages about 12 per cent higher than that of women and girls. Women also

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use their food, especially proteins, more efficiently and economically than do men.

Female tissue, doubtless the very chemicals constituting it, differs from male tissue. So infinite in number are the possibilities of protein formation from varied combinations of 18 amino acids in varied ways that this seems more than likely true. The blood differs likewise, especially after puberty. Man will average 5,000,000 red blood corpuscles per cubic centimeter to woman's average of 4,500,000. The density of female blood is less than that of male. Man's oxygenation surface is about 45 square meters to woman's 40.5, while the amount of blood in a woman does not increase directly in proportion to her size in the same way it does in men.

Glandular differences between the sexes are so marked as scarcely to need comment; they are in fact the root of most other differences. Not only are the sexes equipped with altogether different glands but their glandular balance is different. Their bodies are suffused with hormone secretions of different chemical constitution. It is not surprising that the sexes react very differently not only to industrial poisons, to fatigue while at work, and to such environmental factors as deficient ventilation, but to pathological conditions as well.

Woman's body is phylogenetically older than man's and more primitive; man is the more variable, the more modern, and the less conservative sex. Women preserve old customs and old ways of thinking longer, and are more passive. Not only Eskimo women but even female

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dogs, according to Stefansson, were much less quick to overcome food prejudices and try eating altogether new dietary articles than men. Females may be more liable to childhood illnesses but they stand them better than males. They are longer lived.

Men are more prone to die with rheumatism, cancer, and brain troubles than women, and they stand surgical interference less well. White male deaths from tuberculosis run from 175 per 100,000 at age 35 to variations around 200 at age 75, while white females stand at 100 at age 30, drop to 70 at age 50 and stand at about 100 at 70-75. At age 20 the rate for females is near 150 as against 100 for males of the same age, however. There are similar significant differences in the tubercular death rates between the sexes among colored people. On the other hand the female sex is more susceptible to influenza than the male, their mortality being 25 per cent higher in some cities; females also die more easily than males from complications of influenza and its serious sequellae. Of infectious diseases only pertussis and chorea, in addition to influenza and its sequels, affect the female more seriously than the male sex. "The female sex is, in a general way, more resistant to disease and death, and is hence, in this respect, the 'stronger sex.'"

In England it has been shown that the causes of death and of retirement among teachers display sex differentiation. While the percentage of deaths is greater in proportion of 167 to 100 for men, retirements on medical grounds are more than twice as frequent among women

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—1 in 194 as against 1 in 525 retirements for men. Women age earlier than men, or at least the physical breakup called old age occurs earlier in the middle life of women, and this is not to be confused with the menopause crisis which is a distinct factor altogether. Nervous and functional diseases are cited as causes for retirement three times as frequently in the case of women as in that of men.

Rollo H. Britten reported sexual differences quite as striking in the United States in the *American Journal of Hygiene* for May, 1931, wherein he discussed the "physical impairments of adult life" on a basis of 112,618 medical examinations. The rates were higher for women although the reverse was true of mortality data. There was a very marked excess among women of thyroid trouble, visceroptosis, oedema, varicose veins, tenderness in region of gall bladder and appendix, tuberculosis, bronchitis, and emphysema, "nervousness," and hemorrhoids. Women also more often had casts in urine, deflected septum, and arterial thickening, than did men. For those who require such luxuries I may say that this article is amply provided with tables and graphs.

Given these basic physical differences it is not surprising that tests of children at three years of age show differences in occupational choices. Boys preferred occupations requiring muscular activity, inventiveness and initiative; girls wanted to work with the fingers, to follow instructions, to pursue routine activities. The interests of the girls were, however, more diverse than those of the

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boys. At ages from $8\frac{1}{2}$ to 22 years the findings of numerous investigators have shown a real sex difference in attitudes towards fortune telling. Girls indulge such weaknesses far more than boys at every age level, the difference being most pronounced between $12\frac{1}{2}$ and $14\frac{1}{2}$ years. Woman falls back on her feelings more quickly than man and appears to display somewhat greater credulity.

Tests given 1,000 unselected, comparable individuals who ranged in school from the third grade to the high school, demonstrated that girls were superior to boys in few of the abilities tested. They were better at recognizing color and were more conservative. The boys would dare more; they did much better and also much worse work than the girls—showing a wider range of variation in ability; they could scrutinize and analyze better and were more original. In history, boys are usually better reasoners and they develop an interest in history much better than girls who, however, have a greater sense of rhythm and of color perception.

These things are really quite commonplace matters scientifically, but they appear to reach the lecture platform slowly. There some lecturers still speak of sex as if it were a permanent entity and others follow up by discussing intersexual problems as if male and female differed from each other very slightly if at all. Thus juxtaposed certain evidences of illogic appear, but so long as the lecturers speak separately this unfortunate contingency is avoided.

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The real facts are, as Charles R. Stockard states them in his *Physical Basis of Personality* (pg. 209-9):

The two sexes are, of course, constitutionally different from the time of fertilization of the egg and, as we learn more about the details of growth and development, we are more and more impressed with the presence of these differences even during early childhood, when the secondary sexual dimorphism is not so universally evident. For example, the calcium metabolism and the important reactions depending upon it seem far better provided for in the female child than in the male; this is shown by the higher frequency of infantile tetany in boys as Bakwin and Bakwin have found and the probable high tendency towards rickets in the young male which Nonidez has found among fowls and I have found among dogs. . . . When ovarian secretions are exchanged for testicular secretions, the entire animal body reacts to the changed endocrine complex. These differences are so accentuated after puberty that it becomes apparent that the male and female of a species are constitutionally quite different animals—possibly in some cases their internal chemistry may be as far apart as that of two males or two females of different species.

Turning from physiology to psychology it is the same. As Dr. E. Graham Howe said in the *Lancet* for February 21, 1931, "strange though it may seem, psychologists are not at all sure as to what the difference between a man and a woman really is," but there is an immense difference when the sexes are markedly differentiated. Of course, the male and female sex organs are derived morphologically from the same tissue; hence both male and female are morphologically bisexual. Psychologically the problem is quite as difficult, as in each individual of

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either sex there are varying components of maleness and femaleness, now dominant and now held in abeyance. Functions, experiences, and emotional reactions of the two sexes have differed widely from primitive times on. The tendency of modern civilization to eliminate sexual differences, in so far as physiological limitations permit, is most unfortunate as the happiness of each of us depends upon the degree to which we can express our individualities in cooperation with the similarly expressed individualities of others. The injustice also of neglecting to recognize the basic psychological differences between the sexes—such as the submissiveness of the natural female and the aggressiveness of the natural male—is also weighted with sorrow.

Many lecturers I have heard have also almost uniformly plead in their talks as well as in their books for the acceptance by us in our “civilized,” or at least mechanized, life of the more liberal, “natural” sex practices common among certain primitives, but have altogether overlooked the balancing effect of the native taboos upon those delightful liberties. The breakdown of our own sex *mores* and our present rather chaotic condition, inhere in the fact that our religio-moral taboos have been demolished leaving us no balance for our newly acquired liberties. This came, of course, of the erroneous practice of founding ethics upon religion, which was badly mistaken in the first place. But the remedy is not the introduction of further liberties divorced from newly formulated restraints, and the replacement of old religious

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dogmas with modern liberal creedal assumptions having no scientific significance.

Science says, then, that sex is not the immutable thing certain pseudo-scientists lead us to believe but, secondly, when sexual differentiation takes place it is a very real thing and argues very real differences between the sexes. Lastly, "proving it by the primitives" is bad technique both because you can prove anything you want to prove, if you pick the right primitives, and also because sex liberals will find, upon making a real study of the matter, that primitives have many puritanical or repressive customs which they would far prefer to ignore,—and in their lectures to us usually do.

That, I believe, about brings my discourse upon the liberal sex creed to a close. There is now nothing left for me to do but formulate this material into a lecture and find a hotel rose room. If the word sex occurs prominently in the title of that lecture the inhibited gentlemen and the desiccated virgins will undoubtedly find me and contribute to the support of my family. The misfortune is that rose drapes always depress me and render me unfit for any useful purpose. However, that might especially fit me for lecturing successfully.

FUNDAMENTALS

CHAPTER XVI

THE ROLE OF EDUCATION

ABOUT now it would be quite in place for some one to say this: Educational systems are designed to formulate and to inculcate sound beliefs. At their very best they should equip the individual to find his way intelligently among the systems of belief, and also to formulate beliefs of his own in a rational, modern manner. That our educational system does not do this is almost self evident. A mere glance into the Columbia Teacher's College publication by Dr. Velma Phillips giving *Evidence of the Need of Education for Efficient Purchasing* will prove this. Not only are high school students and housewives naively ignorant about the scientific and economic facts with which they should be familiar in order to live successfully in a profit economy,—and without knowledge of the basic facts the formation of useful beliefs is impossible—college professors and teachers of household economics share this ignorance. Worse still it is proven over and over again that the individual products of our educational system do not have even sufficient rudimentary knowledge about the nature of scientific method, about coordinating knowledge in one sphere with knowledge in another, and about the

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precise and grammatical use of the English language to ask intelligent questions regarding matters upon which they desire information.

For instance, it is quite common for educated people to write in to informational agencies asking such incomplete questions as: "Which is the best vacuum cleaner?" "Can you supply a budget for a family of five?" "Can you send me some information about how to raise poultry?" "Can you give me the facts about the Japanese scientist Nogoshi?" These queries are from college and from university people. The first gives no hint of specific requirements; the second tells nothing about the income of the family or the ages of its members; the third does not say whether a few poultry are to be raised in a backyard or many in a commercial plant; the fourth not only misspells the name of the scientist, but it was addressed to an agricultural rather than to a medical information agency.

Just this minute I came across a letter written to an agricultural information office by a college professor asking that all bulletins mentioned in a certain issue of an obscure state journal that would not generally be on file, be sent to him. The following three letters were also written by presumably educated products of our expensive educational system:

To the Editor: I have been fortunate enough to discover what the breath of life is and what all existence is made up of and I would like to know if you would be interested in my

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discoveries? If so I shall be glad to go into detail at any time.

To the Editor: I agree with your correspondent, Mr. John H. Stange, that the Bible is the greatest scientific textbook we have. But only second to it is Mrs. Mary Baker G. Eddy's "Science and Health, with Key to the Scriptures."

In that book Mr. Stange would learn that coal could never have been formed by condensed vapors from rings around the earth, but that ultimately coal, like all other material things, is but the condensed thought of Divine Mind.

Coal, says Mr. Stange, is carbon. That is true. But carbon is a precipitate of Mind. All is Mind, and Mind is all.

To the Editor: I cannot too heartily corroborate the assertion made in the Forum on November 20 by John H. Stange that the Bible is the "world's greatest textbook concerning the formation of the earth," and everything that is found therein, including coal.

But has Mr. Stange never heard of the "Book of Mormon"? As a scientific treatise dealing with the evolution of races on the North American Continent, it is probably unsurpassed.

And, then, of course it was the Angel Moroni who showed Brigham Young the way to God's coal fields in Utah.

It is a very striking commentary on our educational system that these things should be so. Why is it? We spent \$522,000,000 on public schools in 1913 and \$2,237,000,000 in 1929, the latter sum being equivalent to about \$1,308,000,000 in dollars of 1913 purchasing power. Between 1920 and 1928 the amounts we spent for school libraries increased from \$3,000,000 to \$5,500,000 annually. Whereas sixty years ago only about 18 per cent of our population, or 1 in every 5.6 persons,

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was enrolled in public schools, the figures are now 21 per cent and 1 in 4.8 respectively. Our average annual expenditure for education, per pupil, rose from \$15 in 1870, to \$17 in 1890, to \$20 in 1900, to \$33 in 1910, to \$40 in 1915, to \$64 in 1920, to \$98 in 1925, to just less than \$100 in 1930. Our annual expenses for school buildings rose from approximately \$100,000,000 in 1915 to \$430,000,000 in 1925, or to \$16 annually per pupil against \$4 in 1910, and only \$7 in 1920. The value of our school property per pupil enrolled was \$111 in 1920 and \$218 in 1928. In 1900 the average salary of all public school teachers was \$352; in 1928 it was \$1,364, and in 1930 about \$1,488—though these figures include the inflated salaries of supervisors and principals. Nevertheless it is apparent that we spend lavishly on education in the characteristic American manner and on the characteristic American theory that the mere expenditure of money will produce the results we desire. We spend, but we do not educate.

Not only do we spend more than \$2,200,000,000 annually on public school education, we have our colleges and our universities. We have Yale with more than 5,000 students, with buildings valued at \$33,000,000 or more, and with an annual income in excess of \$11,000,000. We have Columbia University with over 14,000 students, over \$30,000,000 worth of buildings, and annual receipts in excess of \$15,000,000. Besides these we have a vast number of other such institutions. What is the matter with our educational system if people are left so stupid

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that they can regard as worthy of credence many of the frauds and near frauds discussed herein?

As an illustration of the manner in which educational institutions fail to enable students to formulate sound beliefs using facts in a rational manner to that end, let me cite an incident. A while back when the wheat crisis descended upon Kansas the students of Kansas Agricultural College met and decided to help the farmers out by eating one more slice of bread per student per day. It occurred to them, however, that, if this were done, decreased consumption of some other foods might result. It was therefore further resolved that such decreased consumption as proved inevitable should be restricted solely to food products not produced in the State of Kansas. The fact that college and university students should think in a manner so confused, so utterly childish, and so out of step with the facts known to economic science, indicates that a great deal is wrong with our system of higher education. The added fact that a recent survey disclosed high school students to be unaware that the interest charged on installment accounts by dealers was far in excess of the bank rate of interest paid on the savings of depositors further emphasizes the remoteness of present-day education from plain economic reality.

There are many things wrong with American education but I can take time to mention only two. These are: 1. The fact that we do not discriminate accurately between vocational education and true university training, in the sense the latter is understood by Abraham

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Flexner; 2. The further fact that we widely diffuse and dissipate the funds we spend on both vocational education and university training among such a multiplicity of often inferior institutions, that the waste and extravagance are quite astounding. In this connection it is to be remembered that Flexner (p. 42 of *Universities*) defined a university as "an institution consciously devoted to the pursuit of knowledge, the solution of problems, the critical appreciation of achievement, and the training of men at a really high level," such, in large measure, as Johns Hopkins was at in the beginning and rather continues to be, although even it is far from a true university.

Bulletin 38 of the Office of Education, published in 1929, had imbedded in it various tables from which I dug out some statistics and found them to be quite interesting. I give round, not exact figures, both because the statistics are not entirely complete and because, being collected between 1926-28 they would be out of date as exact figures by now. Their general relationships hold, however, and the conclusions I want to establish would likewise hold for new figures when collected. I discovered, for instance, that the State of Kansas had 25 or 26 colleges, universities, or institutions of higher learning, publicly and privately supported, which were attended by approximately 17,500 individuals; the value of the buildings in these institutions was about \$17,000,000 and their annual receipts, omitting additions to endowment funds, was a bit over \$8,000,000. The University of California had at the time nearly 19,000 students, buildings valued

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at \$16,000,000 and an income of roughly \$12,000,000—all figures being on the same basis.

Oregon at this time had 14 institutions of higher learning and professional schools, attended by about 10,500 students, with buildings valued at \$9,000,000, and an approximate annual income of \$5,250,000. The University of Michigan had 10,300 students, buildings valued at \$19,000,000 and annual receipts of \$10,500,000. Colorado had 10 institutions, attended by 9,000, with buildings valued at \$11,000,000, and annual receipts of \$15,800,000; Maryland had 17 institutions, also attended by about 9,000, but with buildings valued at \$23,200,000, and annual receipts of \$7,400,000. Meanwhile the University of Wisconsin had 10,079 students with buildings valued at \$10,400,000, and annual receipts of nearly \$8,000,000. What is to be concluded from this?

There are two kinds of education: 1. Vocational, and 2. Intellectual or abstract. Certain manually dextrous types of individuals should have preponderatingly what is vocational training, not intellectual or abstract education that depends upon the subtleties of mental power. Almost the whole of the education given in our state institutions of higher learning, and a great deal of that given by privately managed professional institutions is essentially vocational education. In short, it can be provided *en masse* without detriment. There is a place, however, in the scheme of things educational for certain institutions which shall specialize in giving to the rare intellectual types the abstract, objective, academic, or quasi-philo-

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sophical sort of education they need. These types will in many cases later follow vocations, but their mental powers will enable them rapidly to absorb in practice vocational technics that must be inculcated laboriously into the majority of manually endowed students.

It is possible to attend the needs of 19,000 or 20,000 vocational students in one amply endowed institution. This makes it rather ridiculous for a State like Kansas to have more than 25 institutions of higher learning with less property and relatively little more income than the University of California has alone. It is quite true that many of these colleges and universities in Kansas were located where they are because of geographical or religious reasons. But if the endowments of the former institutions, and their incomes, were coalesced with those of one or two large central vocational schools such as the University of Kansas and Kansas State Agricultural College, the teaching force could be improved in quality, the technical equipments of the institutions could be ample and adequate, and tuitions could be lowered or transportation provided, or both, to overcome the geographical considerations originally causing the establishment of many small institutions. Furthermore, religiously biased educational institutions are as obsolete now as the wooden plow of the Indians. They have not disappeared, it is true, as has that plow, but there is as much reason for their disappearance in any progressive community. Certainly if they are to be retained, in spite of their anti-

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social character, they should be supported by the small groups holding the anachronistic beliefs that sustain them.

Objections to the centralization of education can be overcome, I believe. It is true, for instance, or was a few years ago, that the chemistry department of Yale had certain big men on the staff. However, if a student should by inadvertence have come screaming and foaming to Yale in search of contact with a great mind in chemistry, he would have found that his contact with this science took place through the leaden medium of freshman instructors who, bar chorus men, are the most standardized and uninteresting individuals I believe I have ever seen. They have graduated and acquired a Ph.D. Their salaries are about \$2,200 to start, and they can crawl up to \$3,000 over long periods of years. They are permitted to do research, if the divine afflatus descends upon them, and laboratories are provided for that purpose in which some of them sit drowsily through long afternoons wondering how research should be undertaken, or how to improve their bridge scores. They are quite lifeless, yet each one of them undertakes the instruction of 40 freshmen in chemistry. This system is admirably designed to kill any vagrant interest in the subject of chemistry that might animate any but the more intellectually eccentric freshmen.

What was true of Yale a few years ago, and probably still is true, also holds for many other large institutions which retain "big" men for window dressing, but carefully insulate them from contact with the ardent student body.

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How could this difficulty be overcome? It would be quite possible by intelligent application to the problem, and assuming the school to be sufficiently well endowed financially, to provide really inspiring instructors clear down the line; by breaking the student body into small groups personal interest could be stimulated. I am rather skeptical, however, whether this is necessary in such vocational schools as the Universities of Kansas, Maryland, Oregon, Colorado, Michigan, Wisconsin, and California. It is absolutely obligatory in the smaller select schools which would cater to the intellectually endowed, and which could be provided with sufficient funds to employ the very finest instructors it would be possible to obtain. These select schools in addition would need little expensive equipment, because the training would be largely abstract, an irreducible minimum of laboratory work in exactitude and scientific method being ample. I am persuaded that if we thus more efficiently utilized the funds we waste so lavishly upon higher education today we could do much to inculcate more rational and more scientific beliefs in the minds of those who are exposed to that education.

CHAPTER XVII

THE NATURE OF BELIEF

SUPPOSE we assume, however, that we have re-organized our entire educational system upon an efficient, economical, modern plan. We have so perfected it that it will effectively inculcate beliefs in the minds of those who need such educational treatment, and will provide the really intelligent with a permanently valuable technique by means of which they may search out facts and themselves formulate beliefs. What is the nature of belief? What beliefs are most valuable?

At this point it occurs to me that I should solve the problem of conflict between science and religion. Unfortunately I really want to do something else altogether. Nevertheless there will inevitably be people who expect a solution of this conflict in a book of this character. For them I have thoughtfully provided a Vermiform Appendix to which they are respectfully referred. Others may continue with me and read the rest of this chapter, as well as the next.

Charles S. Peirce, probably America's only, and certainly her greatest philosopher, asks in his *Chance, Love and Logic* (pp. 41-2):

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And what, then, is belief? It is the demi-cadence which closes a musical phrase in the symphony of our intellectual life. We have seen that it has just three properties: First, it is something that we are aware of; second, it appeases the irritation of doubt; and, third, it involves the establishment in our nature of a rule of action, or, say for short, a habit. As it appeases the irritation of doubt, which is the motive for thinking, thought relaxes, and comes to rest for a moment when belief is reached. But, since belief is a rule for action, the application of which involves further doubt and further thought, at the same time that it is a stopping-place, it is also a new starting-place for thought. . . . The essence of belief is the establishment of a habit, and different beliefs are distinguished by the different modes of action to which they give rise. If beliefs do not differ in this respect, if they appease the same doubt by producing the same rule of action, then no mere differences in the manner of consciousness of them can make them different beliefs, any more than playing a tune in different keys is playing different tunes. Imaginary distinctions are often drawn between beliefs which differ only in their mode of expression; the wrangling which ensues is real enough, however. . . .

In his *Making of the Modern Mind*, John Herman Randall says this:

A man today will believe that the mercury atom can be changed into an atom of gold, and that Jesus of Nazareth rose from the dead and now sits at the right hand of God; that it is glorious to die on the field of battle for one's country, and that all disputes between nations should be settled in a world court; that the unions should be smashed and that the world should be made safe for democracy; and he will believe these things with as little sense of their origin and their meaning and their relevance to his own life as the Roman boy playing in the streets displays towards the past embodied about him.

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This leads directly—and I am deliberately trying to make certain distinguished thinkers write this chapter for me—to something Friedrich Paulsen said in his *A System of Ethics*:

One's conception of the universe, we may therefore say, is, so far as it includes and expresses judgments of value, the mirror of one's will. Everybody interprets the phenomena so that they may harmonize with his character. Just as every life surrounds itself with symbols of what it holds dear and valuable, so it strives to formulate a conception of things which will have a quieting and elevating influence upon the will.

F. Mathias Alexander says this in a more modern form in his *Constructive Control of the Individual*:

We all think, except when forced to do otherwise, in accordance with the peculiarities of our particular psycho-physical make-up. . . . Immediately we reach a point with which we disagree, our more or less debauched kinaesthesia can not control the impulses which, when set in motion, put us out of communication with our reasoning. Yet, in spite of this, books are written, lectures given, sermons preached, speeches made in the belief that ideas which are given out by these means can be satisfactorily assimilated by hearers or readers, and that good ideas may thus be passed on for the uplifting of mankind in social, religious, political, and other spheres of activity. Here we have a great delusion. For, as we have shown, our degree of ability to assimilate a new and unfamiliar idea, or to overcome our prejudices in connexion with our cherished ideas and beliefs, depends upon our individual conception of such ideas and beliefs, and this conception is conditioned by the standard of individual psycho-physical coordination and of reliability of the sensory appreciation. . . .

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You will note this powerful emphasis upon individualistic reactions, prejudices, and sensory appreciations. We begin to find need of standards, of some measuring apparatus, and of some mechanism for the objective evaluation of beliefs. How can we judge among them?

Enter C. E. M. Joad with his *Essays in Commonsense Philosophy*, bringing another factor for consideration and saying:

No man wishes to be original all by himself. It may be that this tendency arises from a sort of spiritual loneliness of the kind attributed to tender-minded philosophers, which leads them to endow the Universe with a something not alien to their own consciousness. Just as a man appears to be social politically, he appears to be social mentally. No philosopher is really content with the conviction that he has found truth. He is lonely with truth and is not content until others share it. Hence propaganda, and, in extreme cases, persecution. But once grant that our selection of truth is not free, but that our choice is conditioned in part by temperament, and the irrationality of endeavoring to make others see truth as we see it becomes overwhelmingly clear.

Santayana expresses the same thought in *Soliloquies in England*:

Man, however, is a gregarious animal, and much more so in his mind than in his body. He may like to go alone for a walk, but hates to stand alone in his opinions. And he is so imitative that what he thinks he most wishes to do is whatever he sees other people doing. Hence if compulsory organization disappears a thousand free and private organizations at once take its place. . . .

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Santayana continues then, in this chapter on "Liberalism and Culture," to discuss the manner in which private organizations impress the individual by truculently vociferating their belief in their belief, by vindicating themselves, and then by demanding that others share their beliefs. He has also declared, indeed, that he was almost forced to leave America because so many organizations impetuously and even impudently demanded that he subscribe to and support their beliefs. Yet as the original journal called the *Freeman* said in its issue of February 9, 1921:

We have never cared much what people thought about anything; not half as much about that do we care as that they should enjoy with us the adventure and the free-masonry of simple, disinterested thinking. . . . A great deal of the fun in thinking depends on disinterestedness. When one gets too much concerned with agreement or disagreement, one drifts into mere dispute, into taking one side or another and defending that; into embracing some formula or other and defending that; and then one is not thinking, really, except as a prepossessed person, a lawyer or an advocate, or a party-politician, is said to think.

The same idea, and it bears repetition, occurs in variant form elsewhere. Thus Everett Dean Martin in his *Behavior of Crowds*:

Ideas and beliefs which seek their verification in the character of the results to which they lead, may point to very great changes in experience, and so long as the believer takes into account the various elements with which he has to deal, he has not lost his hold upon reality. But when one's beliefs or principles become ends in themselves, when by themselves they

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seem to constitute an order of being which is more interesting than fact, when the believer saves his faith only by denying or ignoring the things which contradict him, when he strives not to verify his ideas but to "vindicate" them, the ideas so held are pathological. The obsessions of the paranoiac are of this sort.

Eugenio Rignano, in the *Psychology of Reasoning*, writes on what he aptly calls "intentional reasoning," and says:

A strong and irrepressible sentiment, religious or akin to that of religion, leading irresistibly to its end and inhibiting every mental phenomenon, preceptive or evocative, which is opposed to it, is what chiefly characterizes metaphysical reasoning in general. It may be said of the metaphysician, as of the religious man, that what matters to him most of all is not truth but rather the object of his faith.

These are the beliefs Bernard Hart in his *Psychology of Insanity* describes as held in "logic-tight compartments," inaccessible to argument, and almost inevitably retained. "We preserve the traditional beliefs of our childhood in spite of the contradictory facts constantly presented by our experience." He calls this "dissociative thinking," and adds:

All these non-rational opinions and beliefs appear to their possessor as propositions whose truth is immediately obvious, and whose validity it is silly to doubt. They are held, moreover, with a peculiar emotional warmth and instinctive certainty, which it is difficult to define. . . . Genuine knowledge, the product of scientific deduction from observed facts, appears in quite another guise than this. It is relatively cold, and devoid of the warmth which accompanies non-rational belief. If

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its truth is called in question we are not annoyed, but are merely stimulated to examine with renewed attention the foundations upon which it rests.

In his *Conduct of the Understanding*, writing on "Prejudice," John Locke said:

He that is strongly of any opinion must suppose that his persuasion is built upon good grounds, and that his assent is no greater than what the evidence of the truth he holds forces him to, and that they are arguments and not inclination or fancy that make him so confident and positive in his tenets. Now if, after all his profession, he cannot bear any opposition to his opinion, if he cannot so much as give a patient hearing, much less examine and weigh the arguments on the other side, does he not plainly confess it is prejudice governs him?

Finally, Miguel de Unamuno in his *Tragic Sense of Life* tells us this, which says a great deal, for he is a good Roman Catholic:

Our doctrines are usually the means we seek in order to explain and justify to others and to ourselves our own mode of action. And this, be it observed, not merely for others, but for ourselves. The man who does not really know why he acts as he does and not otherwise, feels the necessity of explaining to himself the motive of his action and so he forges a motive. What we believe to be the motives of our conduct are usually but the pretexts for it. The very same reason which one man may regard as a motive for taking care to prolong his life may be regarded by another man as a motive for shooting himself.

Retracing our steps now we find, in the quotation from the *Freeman* editorial, emphasis placed upon that disinterestedness which must be exercised in formulating

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rational beliefs for, as Martin correctly says, when the belief becomes an end in itself, it becomes a doctrine more interesting than fact, and soon a dogma more important than sanity or humanitarianism. It must be vindicated. It must be upheld by what Rignano calls "intentional reasoning." The object of faith becomes more important than objective truth. The doctrine ultimately metamorphoses into something transcending reason; it becomes now inaccessible to logic and is held with a peculiar emotional warmth that renders its devotee liable to flame up and explode at the slightest opposition.

When one reaches such a point in the formulation of beliefs he must, as John Locke warned years ago, be on the alert that his assent is not greater than the evidence forces him to give. Finally, as Unamuno remarks, he may begin to use the belief, or the doctrine, in order to explain and justify to others, and even to himself, his mode of action. It is to be remembered that the irreligious reformer goes through these stages of belief quite as much as the pious church member. Furthermore, a great deal of commercial advertising propaganda is characterized by intentional reasoning which later transcends reason altogether, is held with emotional warmth, seeks to vindicate itself, to convince the consumer, and to justify the manufacturer in any sort of dishonest and unethical procedure whatever.

These various statements by many thinkers so obviously apply to what has been said earlier in this book that I intend to make no detailed application of them here.

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Suffice it to say that there are beliefs in confusing multiplicity; that the same mind can hold many irrelevant beliefs with apparent conviction; that our own personal prejudices tend to make us hospitable to certain beliefs; that we are so gregarious as not only to entreat, but to command, others to share beliefs which make us comfortable and happy; yet that it is more important to think and to discover truths than to hold emotional convictions and to vindicate opinions. Finally, it is evident that we should not use our doctrines as justifications for our actions, but that we should act in accordance with objectively ascertained facts. Why then, with all our riches and all our advantages, do so many of us persist in holding to the truthfulness of valueless beliefs? Will science save us?

In the next chapter I want to consider the manner in which science may be utilized as a standard of measurement for evaluating beliefs. In closing this chapter it seems appropriate only to explain the basic nature of scientific beliefs and the peculiar manner in which they differ from all other beliefs. I cannot do this better than by permitting a very much wiser man to speak for me—again it is Charles S. Peirce. He is speaking of the scientific concepts of truth and of reality. His words may be found in the *Popular Science Monthly* for January, 1878, or in his collected essays, entitled *Chance, Love, and Logic*, pages 56-57. He says:

On the other hand, all the followers of science are fully persuaded that the processes of investigation, if only pushed far

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enough, will give one certain solution to every question to which they can be applied. One man may investigate the velocity of light by studying the transits of Venus and the aberration of the stars; another by the oppositions of Mars and the eclipses of Jupiter's satellites; a third by the method of Fizeau; a fourth by that of Foucault; a fifth by the motions of the curves of Lissajoux; a sixth, a seventh, an eighth, and a ninth, may follow the different methods of comparing the measures of statistical and dynamical electricity. They may at first obtain different results, but, as each perfects his method and his processes, the results will move steadily together toward a destined center. So with all scientific research. Different minds may set out with the most antagonistic views, but the progress of investigation carries them by a force outside of themselves to one and the same conclusion. This activity of thought by which we are carried, not where we wish, but to a foreordained goal, is like the operation of destiny. No modification of the point of view taken, no selection of other facts for study, no natural bent of the mind even, can enable a man to escape the predestinate opinion. This great law is embodied in the conception of truth and reality.

This peculiar, almost mysterious, inevitability and inescapability of scientific truths is their most distinguishing characteristic. Ten scientists with ten different ideas of how much phosphorus there is in milk may make their determinations in ten different ways. But, in so far as they use the method and the logic of science, correctly and precisely, their ultimate results are destined to approach one precise value. True enough, as Peirce has shown, chance makes the exact result appear to vibrate slightly above and below a certain "average" value used

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for all practical purposes. But the closeness with which various workers using various scientific technics may approach that precise value is most significant when one considers how impossible such a procedure would be in a philosophy, in a religion, or even in a social science today. This brings up the question: What is scientific belief good for? What utility has it? Let us proceed to a new chapter to find out if we can.

CHAPTER XVIII

THE MEASURE OF SCIENTIFIC TRUTH

WE live surrounded by the demands and commands of beliefs of all kinds. Daily, hourly, the beliefs hammer at us—in the press, from the magazines, over the radio, down from the lecture platform. We may well ask—what shall we believe to be saved? Which of these pugnaciously battling systems of belief shall we adopt in order to have refuge from fear and disaster? Above all, where does science stand in this chaos, and what inducements can it hold forth to us?

Confusion is worse confounded because many scientists themselves have not kept their faith. It is to be expected that laymen in an acquisitive society would often themselves be misled about science, and will more often deliberately mislead others. But what shall we say of the spurious and extraneous social, ethical, moral, and religious excrescences and addenda to science formulated by Eddington, Whitehead, Jeans, Millikan, and now by even Bertrand Russell himself? What legitimate authority has science in these spheres? What is the function of science as a system of belief?

We may well ask in some dismay: Is even science re-

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liable and, if so, to what use shall we put it? Of course, all is not science that claims to be. As Henri Poincare remarked long ago you may make the most meticulously exact measurements of the length of a ship, the height of its mast, the power of its engine, and the speed of its motion, and you may formulate these into whatever elaborate system you wish, but by such means you will never arrive at a figure representing the age of the captain. So much of the "science" that is thrust at us today is really pseudo-science or quasi-science. Results are demanded which please preconceptions already entertained. Research is undertaken that is deliberately designed to support or to confirm this or that claim for this or that ulterior motive. There is often no setting out open-mindedly to learn in an unprejudiced manner about the phenomena forming our environment. There is instead an effort to bend science to the service of ulterior objectives.

Science is complete within itself. It is a closed system which develops logically in certain definite ways, and all this is quite indifferent to the desire on the part of manufacturers, agencies, competing systems, or lucrative interests to inculcate certain beliefs. This closed system is useful because it can be utilized to afford an exact means of measuring or of evaluating other systems of belief. True enough one could evaluate all other systems of belief in terms of Swedenborgianism, of Mormonism, of Vegetarianism, or of Socialism. But would it be worth while or even useful to do so? Would it not be

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better to evolve some more definite and universally applicable system of measurement? Does not science offer such a system? I speak now of pure science, uncontaminated by ulterior motives, and as distinct from pseudo-science. Science, in spite of what Eddington, Jeans, Whitehead, Millikan, and even Russell seek to teach us, has no religious, moral, social, or ethical significance *per se*; but it can serve us in our efforts to evaluate beliefs in all these spheres and in all others besides.

Thus we live in the midst of an incessant battle on the part of religious leaders, reformers, manufacturers, advertisers, charlatans, politicians, physicians, scientists, and lay individuals, who would have us believe certain things because they find it profitable to believe them, or because they think happiness lies in the acceptance of those beliefs. On all sides we are bombarded with so-called facts, with varied propositions, and with statements that are impressive in appearance. We, in our turn, each have our own beliefs to which we are emotionally wedded. Why do we entertain these beliefs? What facts, if any, really underlie the blatant efforts of various individuals and agencies to entice us into believing the propositions they assert to be true?

Specifically: Is it right and good to believe, as do the Mormons, that Jesus Christ once worked among the American Indians, or, as certain advertisers insist, that Listerine is an effective antiseptic? That tobacco, or coffee, or alcohol is harmful or beneficial to the human system? That we should eat roughage, take violent exer-

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cise, or drink acidophilus milk? That certain things will preserve our teeth, protect us from or cure our colds, enable us to produce a race of superhuman beings? All individuals and agencies can give apparently sound and convincing reasons to sustain their statements, and can adduce apparent facts in proof. Yet, not only do many of these beliefs clash with each other, but in most cases they are more or less diametrically in opposition to science as well.

Is this significant or of importance then? Is science itself to be trusted? Does it give us final truth about reality as a complete terminal experience? Science is simply another system of belief based upon postulates or axioms which are irrational but are assumed true for certain useful purposes. Moreover science aims at an objectivity and a freedom from emotional bias and intellectual prejudice that other systems of belief are not so careful to eliminate. At its best science is interested neither in producing emotional convictions nor in accumulating a large monetary surplus. It seeks not to mutilate facts. It endeavors to be tentative, to be tolerant, and to be sufficiently skeptical to learn new truths easily. It is not only open-minded, it knows how to suspend judgment when facts are not available, and how best to procure these facts and to preserve them from damage.

But just what does science purport to do or to explain? Does it grapple with true reality and explain why phenomena occur? An instance will probably elucidate this

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point. It is often necessary to determine what is called the "bound water" in various plant tissues. However, there can be no satisfactory definition of bound water. All that can be said is that it is not "free" water, i.e., that it does not manifest the common properties of liquid water and is, therefore, somehow "bound." There is, of course, evidence for the existence of bound water or it would not be postulated. We might mention the manner in which dextrose and levulose take up water in forming sucrose or common sugar; the adsorption of water by such things as carbon black, silica gels, platinum black, alumina; or the water that is somehow tied up in such gels as gum arabic gel. But that is essentially all we know about bound water.

When bound water is determined we really measure the free water, and then arrive at a figure for bound water by mathematical difference. If the so-called "cryoscopic" method of determination is used, this is based on the pure assumption that bound water will not dissolve sugar because it is not free to do so. But we do not know whether the addition of the sugar to the material changes the bound-free water equilibrium or not, or whether the sugar is not changed chemically, or even adsorbed by the material. If we use the "calorimeter" or the "dilatometer" methods of determination we have to assume that the bound-free water equilibrium is not changed by the freezing of the material tested at the low temperatures that have to be maintained.

In short, whether these words themselves are compre-

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hensible to laymen or not, it is evident that pure assumptions have to be made in order to carry out the determination at all; it is also evident that the thing determined cannot be defined, but must be assumed to exist because we have certain indirect evidences of its existence. Yet—and this is important as indicating what science actually does—this method of measurement, being, as it is, rigidly standardized, has a meaning and gives the scientist valuable comparative or relative information that he can use effectively to the increase of knowledge about plant materials and their structure.

Science, therefore, offers us a mechanism of evaluation in the world of contending beliefs; it offers a method by means of which we may weigh the other belligerent beliefs against one another. Truly enough it makes use of pure fictions in its endeavors. So does our monetary system. Since it is no longer coined, the gold dollar has long been a pure fiction, but it evaluates and stabilizes a monetary system wherein silver, nickel, paper, and mere promises to pay, are usefully accepted as legal tender. Again, both the meter and the foot are pure fictions in so far as any direct reference to tangible reality is concerned, yet they enable us to elaborate systems of measurements that, in their turn, aid us in evaluating the universe about us.

While the gold dollar is definitely a fiction, because in a sense it no longer exists, it yet affords us a means of measuring the value of all sorts of commodities from pigs to Empire State Buildings. While the meter is a

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fiction, because it has been found not to bear the intended relationship to the circumference of the earth it was originally supposed to have, it, like the foot, may be used to evaluate a wide variety of objects and substances. We may measure carpet, or marble, or furniture, or gold bars with a foot-rule, yet it does not partake of their essence or substance. It does not come into head-on conflict with them at any point, nor can it ever be said to be at enmity with them. In precisely the same way we can use science as a measuring rod of beliefs, and do this to our own ultimate happiness and relief from stress.

We may thus evaluate any other systems of belief, such as a religion, in terms of science, but it would be impossible to produce conflict between science and religion, simply because measuring rods do not conflict with the objects they measure. It is, of course, possible to take some system of religion as our measuring rod and to evaluate science or other systems of belief in terms thereof. This leads to confusion for the same reason that it would confuse the financial world of today to use oxen as legal tender. Financiers would ask, are the oxen fat or lean? Are they young or old? Are they in good health or ill? Are they strong or weak? Oxen vary so that their use as tokens of exchange would be fantastic. To a lesser degree the use of a bushel of wheat as legal tender would be perplexing. In a very similar manner the use as a measuring rod of the distance from the tip of the nose to the tip of the fingers of a six-foot man would be disadvantageous.

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Again, it might give great joy and content to some soul to evaluate the dimensions of objects by using a flexible tape measure. One might very well construct a house using a rubber tape measure in the work. It would be a queer looking house, but the mere fact that mathematical science provides a nonflexible unit of measurement and the rules governing its use, does not compel anyone to use that unit of measurement in accordance with those rules.

Yet again, when an Ohio state psychiatrist, by a careful study of the inmates of reformatories and homes for incorrigible boys, discovered that religious training of the young apparently had no preventive effect upon their commission of criminal acts and misdemeanors, he aroused the clergy. They were in arms because they said he mercilessly attacked the religious education of the young; therefore he was an atheist and a heretic. But he was doing nothing of the sort. He used science as a measurement of other beliefs and he inevitably reached certain conclusions. However, science can merely present the evidence. It is quite unprepared to act coercively in the enforcement of its conclusions.

Herein it differs markedly from other systems of belief. For instance, I know of colleges and universities which instruct students on the basis of textbooks of chemistry, physics, astronomy, and biology which are very deliberately written for the especial use of some denomination in enforcing its sectarian beliefs, and in which science is altered that it may not conflict with

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specific religious dogmas. Such education is not only anachronistic and antiquated in this age; it is directly anti-social. It is as obsolete as the elaborate ritual surrounding the rising from and the retiring to bed of Louis XV of France.

This is not to detract from the debt I believe that civilization owes religion for keeping learning alive when nobody else was sufficiently interested to do so. Again, any system of belief acquires intangible values which, overlaid with thick layers of tradition, render it actually of more importance than it possesses intrinsically, and I am not prepared to say that immediate, open, violent rupture with the past would better our situation. In fact, science itself makes no leaps and is evolutionary rather than revolutionary. But we must recognize the fact that times have changed, and that the claims of scientific rationalism should now have a greater hold upon society. Undoubtedly many people can only find happiness when they use as measures of belief elastic mental tape measures which actually confuse and confound more than they elucidate. It is necessary, however, for lasting happiness, that our unit of measurement and the system of evaluation formulated thereupon be constant, universally applicable, and reliable. For this reason the evaluation of the conflicting beliefs in the world in terms of science seems justifiable and likely to produce more permanently useful results, than their evaluation by means of any other system of belief.

In this process we should proceed in something the

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manner the physicist does when he utilizes the kinetic theory of gases. Two hundred years ago Daniel Bernoulli made the fortunate guess that the tendency of a gas to expand might be attributed to a rushing hither and thither of its molecules, but he could offer no experimental proofs of his assumption. This theory was mathematically investigated by Maxwell and by Boltzmann who achieved more credit than Bernoulli because their theoretical anticipations were borne out quantitatively by laboratory experiments performed in their time. Even then such distinguished scientists as Kelvin and Ostwald remained hostile to the theory for experimental reasons of their own.

In 1827 Brown observed what have since been called the "Brownian movements." For he saw that fine particles when suspended in a liquid appear, under the microscope, to be constantly aquiver. Adherents of the kinetic theory of gases said that these quiverings were caused by the impacts of fluid molecules on the particles. Still the Brownian movements were not proven to be in exact quantitative agreement with the remainder of the kinetic theory till Einstein supplied exhaustive mathematical proof, and stated precisely what the movements *would be if* the kinetic theory of fluids corresponded to scientific reality. Finally, Perrin submitted the Brownian movements to precise quantitative measurements and these checked up with Einstein's mathematical anticipations—though a considerable discrepancy remained which Einstein later proved to arise from Perrin's miscomputations.

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The kinetic theory of gases assumes that gas molecules are separate particles with perfectly elastic properties. They are also assumed to have mass, but to occupy no space, and to exercise no attraction upon each other. The particles are further assumed to be in constant, rapid motion and their total energy content may be expressed as kinetic energy, $\frac{1}{2}n mc^2$, if you are inquisitive about it, when n is the number of particles, m the mass of each particle, and c the average velocity of the particles. However, a gas that conformed to all these conditions would be an ideal gas and it alone would conform rigidly to the mathematical formulas postulated by the kinetic theory of gases.

No real gases obey the rules, of course. For one thing, perfect elasticity does not exist in nature, so far as we are aware. Then molecules almost certainly do occupy space. This space may be little more than a sphere of influence, granted, but it is also almost certain that there is attraction between molecules, an attraction amounting itself to an increase in pressure—at least in aggregate effect. Likewise, modern physics pictures a molecule as not only increasing its speed, and hence its kinetic energy, as heat is applied, but also as spinning on an axis and perhaps vibrating. Finally, there are electronic charges resulting from collisions and possibly other energy-consuming processes going on which would affect specific heat, heat conductivity, and viscosity.

Enough has been said to show that the theory applies to no known gas. It applies accurately only to a fic-

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tioned, unreal, "ideal" gas expressly postulated to have properties especially imagined to make it conform to the theory. Nevertheless this theory, though rooted in fiction, offers a reliable and useful system of measurement by means of which the actions of real gases may be evaluated. Thus we are enabled to say that at a pressure of 1,000 atmospheres and a temperature of Zero Centigrade, nitrogen occupies more than twice as much space as would the same quantity of the "ideal" gas, or that, at certain temperatures, the viscosity of air increases more than the 100 per cent which it should increase, when regarded from the standpoint of the "ideal" gas. Hence gases may usefully be grouped in order, or in classes, in accordance with the information supplied to the physicist by the kinetic theory of gases.

It is obvious that the physicist uses such theories as evaluating mechanisms. Thus when physicists state the law of falling bodies, they do not describe the way in which any known bodies actually fall. Instead the law applies only to bodies which fall in a vacuum, which does not exist. However, this law gives us a norm which we may use in evaluating the fall of a body through alcohol or molasses. On the other hand, it is apparent that molasses might have been used as a standard medium in the first place, instead of a vacuum, except that we can standardize our concept of a vacuum much more easily than we can standardize and precisely define molasses. The physicist does not say that such a law is a "natural law"—or he should not say so—because bodies do not

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behave in accordance with it in nature. But, by the removal of certain disturbing factors, the fictioned fall of a body in a vacuum becomes a useful evaluating mechanism.

In quite similar manner we may use science still more broadly as a standard, and select our beliefs thereby more intelligently and more rationally than we are able to do without guidance in this world of rampant disorder and chaos. Such a utilization of the method and philosophy of science will enable us to weed out many of our beliefs and to discard them as superfluous, confusing, or irrelevant. While the utilization of science as a mechanism of evaluation may bring us much sorrow initially, because we yield up old beliefs with sadness and embrace new ones with fear and trepidation, its adoption by us will almost certainly produce more genuine happiness in the end than the adoption of any variety of joyful ignorance could possibly bring to us.

In 1915 the late Thomas Hardy wrote in a letter to Dr. C. W. Saleeby these words: "You must not think me a hard-headed rationalist for all this. Half my time—particularly when writing verse—I 'believe' (in the modern sense of the word) not only in the things Bergson believed in, but in specters, mysterious voices, intuitions, omens, dreams, haunted places, etc., etc. But I do not believe in them in the old sense of the word any more for that." Hardy indeed felt he could demonstrate that no man is a rationalist, and that human actions are seldom or never ruled by reason, in the last resort. But, you see, he distinguishes very clearly between the "be-

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liefs" he deliberately entertains emotionally, for specific esthetic purposes, and the manner in which these beliefs were entertained by people in ancient times. He displays himself to us as a rational man, living in a scientific era, who could momentarily put himself emotionally *en rapport* ancient beliefs he actually no longer credited in a strictly modern, rational sense. He did this for a specific purpose and he knew why he did it. In a sense he used science as his measuring rod, even while he was also utilizing the elastic tape measures of poetry and magic.

The essential, as I see it, is to cultivate the ability to distinguish between intellectual and emotional beliefs. Something about this may be found in I. A. Richard's *Practical Criticism*. Intellectual beliefs which, for present purposes, we may regard as scientific beliefs, have no power to confute and demolish emotional beliefs. Scientific disbelief does not make emotional belief in the same idea either impossible or even difficult. It does not even make emotional belief undesirable, so long as it is recognized as such. For emotional beliefs are not justified by facts, nor by their logical relationships to rational ideas; their justification is their success in meeting our needs as human beings—"due regard being paid to the relative claims of our many needs, one against another." In other words, it is a matter of the prudence, in view of all the needs of our being, of the emotional consequences the belief produces. The desirability of an emotional belief, then, has nothing to do with science or intelligence, and it may be very useful, provided its character is

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recognized, and further provided it is not permitted to interfere with intellectual and scientific systems of belief, their progress and expansion.

In his astounding article in the *Popular Science Monthly* for January, 1878, Charles Peirce wrote on "How to Make Our Ideas Clear." Therein he found "The meaning of a concept . . . in all the conceivable experimental phenomena which the affirmation or denial of the concept could imply." He declared that the "real" phenomena were those whose characters did not depend upon what anybody thought them to be, but were independent thereof. He concluded that, "The opinion which is fated to be ultimately agreed to by all who investigate, is what we mean by the truth, and the object represented in this opinion is the real." That definition of scientific truth has never been much improved upon, in spite of William James' fussy and fox-terrierlike obfuscations.

The sentence might be edited to say that "The opinion which is destined to be ultimately agreed upon by all who investigate in the scientific spirit and using scientific method, is what science means by truth; the object represented in this opinion is, according to science, the real." Truths so ascertained and real objects so agreed upon become evaluating mechanisms. They offer us the opportunity to weigh other beliefs and to assay or to appraise them. Such is the measure of scientific truth; such is the fundamental and by far the most important use of science.

VERMIFORM APPENDIX

("A narrow, blindly ending tube. . . . It represents an atrophied terminal part. . . . It has no useful function"—Webster, the unabridged.)

PEACE, BRETHREN, PEACE!

THERE has for a long time existed what impresses me, at least, as an unpardonable antipathy on the part of scientists to the doctrines espoused by the variety of mystic we call a fundamentalist. In return there has been considerable also unpardonable animosity exhibited by the fundamentalist mystic towards the scientist and his doctrines. Instead of taking sides in this controversy I am going to assert that I think both contenders are wrong.

Consider first the mystic fundamentalist. He has most often taken umbrage at "evolution." I place the word in quotation marks because, in the first place, it has never finally been defined either by scientists or by mystics. I could readily regale you with at least fifty definitions of evolution from scientific sources alone. How many religious definitions could be collected I have no means of knowing. One particularly inaccurate one is to the effect that it implies the descent of men from monkeys.

But suppose we presume that evolution merely means

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what it often does mean to common lay understanding—that more complex organisms, or groups of organisms, somehow arise from simpler ones. The fundamentalist certainly believes in that. He believes that man was created little more than six thousand years ago. He believes that creation produced one white man and one white woman. He sees the wide variety of human beings today—from races of dwarfs to races of giants, from almost black to quite pink in color, from mental sluggishness to brilliant intellect in mind—and he accepts these as facts of his environment. It is therefore obvious that he believes in evolution, only the type of evolution he espouses he believes to have taken place much more quickly than any scientist would dare assert. Indeed it appears to me that the scientist is a less fervent believer in evolution, of this type, than the fundamentalist. Why the animosity?

Belief in evolution is an old and hallowed doctrine anyway. It has been said that we should all be religious because no race has ever been found which is not religious. In the same way we should all be evolutionists, for there is no race that failed to subscribe to belief therein. It has long been known, of course, that ancient Greek philosophers taught the theory of evolution and elaborated it in some detail. But the matter goes further back into antiquity than that. The ancient Hindus understood the principles of heredity and of inheritance and were evolutionists. If you find this difficult to believe then read the "Satapatha Brahmana," the "Laws

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of Manu," the "Saddharma Pundarika," the "Apas-tamba," the "Hymns of Arthara Veda," the "Institutes of Vischnu," the "Sankayana Grihya Sutra," or the "Brihadarany a Upanishad" and confute me if you are still in physical condition to do so.

For therein we read—"The same seed which is laid is brought forth"; that "the seed infused into the womb is fashioned. . . . For what like seed is fashioned in the womb, such like it is born." This is modern heredity with a vengeance. We read—"The animal becomes manifest to its own form, cow to cow, horse to horse, and man to man," also that "On comparing the seed and the receptacle of the seed, the seed is declared to be more important, for the offspring of all created beings is marked by characteristics of the seed," which is evolutionary doctrine. Finally we read—"It is from the remote end downwards that a race is propagated"; also that the diseased should not marry, and other rules are formulated to govern heredity in a purely evolutionistic manner.

Muhammed ibn-Ahmad al-Warraq, surnamed al-Kutubi, announced the Darwinian theory in his "Ilm al-Tabai" in 1363 A.D. where, speaking of the monkey, he said, "This animal is considered by those versed in biology as a combination of man and animal. In face it represents the natural gradation from the animal to man. And it is similar to man in its form and acts." The Zuni Indians in America had a very elaborate and complete theory of evolution. They held that the animal ancestors of men lived in the lowest of four caves under the

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earth and that, as Culture Heroes brought them forth, they gradually assumed an upright posture. As they climbed up from cave to cave they lost bestial and gained human characteristics. When they finally got to the earth it was very moist and inhabited by powerful man-eating creatures which were slain by the Culture Heroes with magic arrows of lightning. These huge beasts died, their bones turned to stone, and were buried in the earth. Hence fossil remains uncovered by modern evolutionists did not impress the Zuni who knew that such gigantic remains were bound to be found in the earth.

Indeed the Very Reverend Howard Chandler Robbins, Dean of the Cathedral of St. John the Divine, stated from the Cathedral pulpit in 1928 that Jesus himself was well aware of the Darwinian theory and did not object to it. He knew, however, that men were unprepared for such revelations when he was on earth, so he decided to reserve the matter for later consideration saying only, "I have many things to tell ye, but ye cannot hear them now." By this, says Dean Robbins, Jesus meant the revelations of modern science and of evolution; hence conflict between the Darwinian theory and Genesis is reconciled.

Further reconciliation took place in that same year only a month or so after the Dean brought the matter to celestial attention. For in Knoxville, Tenn., there was born a girl child bearing an authentic tail about seven inches long. She was not a record breaker as there exists evidence of a twelve-year-old French Indo-

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Chinese boy with a tail nine inches long and twenty-five other authentic cases are known. In certain human embryos the tail is often one-sixth the body length anyway and is shed before birth. These apposite facts so firmly establish the theory of evolution as a basic doctrine of religious fundamentalism that animosity towards scientists on the part of the pious becomes incredible.

Turning now to the scientist, I think it only reasonable to say that he is not always as nice as he should be. If the fundamentalist often attacks his pet theory of evolution he is, in turn, quite ready, on occasion, to ridicule the fundamentalist's belief in the plenary inspiration of the Bible. Indeed the scientist will frequently celebrate his emancipation from supernaturalism by denouncing the idea that the Scriptures are inerrant, and he has at times been known to sniff superciliously at the pious who find in words from the Writ ineffable and ineluctable truth.

Yet I see no reason why the scientist should be irreligious on this account. Is he not a man whose labor is in wisdom but the product of whose travail goes to those that have labored not, but who smoke fat cigars, clip coupons, attend conferences, and ride in limousines? Is he remembered or rewarded more than the fool? Could he do better, if he were so minded, than to eat, drink, and be merry? Even when he becomes so all-sufficiently contemptuous of belief in the supernatural, in immortality, and in heavenly rewards, I can see no reason at all

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why he should discard the Bible or deny its hallowed truths.

Indeed, I see no reason why the scientist should refuse to adopt as the fundamental premises of his religious edifice certain words taken verbatim from the King James version of the Christian Bible. He should thus also be able to obliterate much of the antagonism between science and the fundamentalist Christian religion without deviating a step from his principles. I suggest, therefore, that he direct his attention to the following statements taken word for word from the orthodox version of the Christian Bible, use them as basic religious postulates, and become avowedly and Biblically religious. To this the fundamentalist mystic cannot take exception for he fully accepts the plenary inspiration of each word in the Holy Writ.

The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun. Is there anything whereof it may be said, see, this is new? it hath already been of old time, which was before us.

There is a man whose labour is in wisdom, and in knowledge, and in equity; yet to a man that hath not laboured therein shall he leave it for his portion.

For there is no remembrance of the wise man more than of the fool forever; seeing that which now is in the days to come shall all be forgotten. And how dieth the wise man? As the fool!

For who knoweth what is good for man in this life, all the

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days of his vain life which he spendeth as a shadow? For who can tell a man what shall be after him under the sun?

A man hath no better thing under the sun, than to eat, and to drink, and to be merry; for that shall abide with him of his labour the days of his life. . . .

The race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to them all.

For what hath the wise man more than the fool? Be not righteous over much; neither make thyself over wise; why shouldst thou destroy thyself?

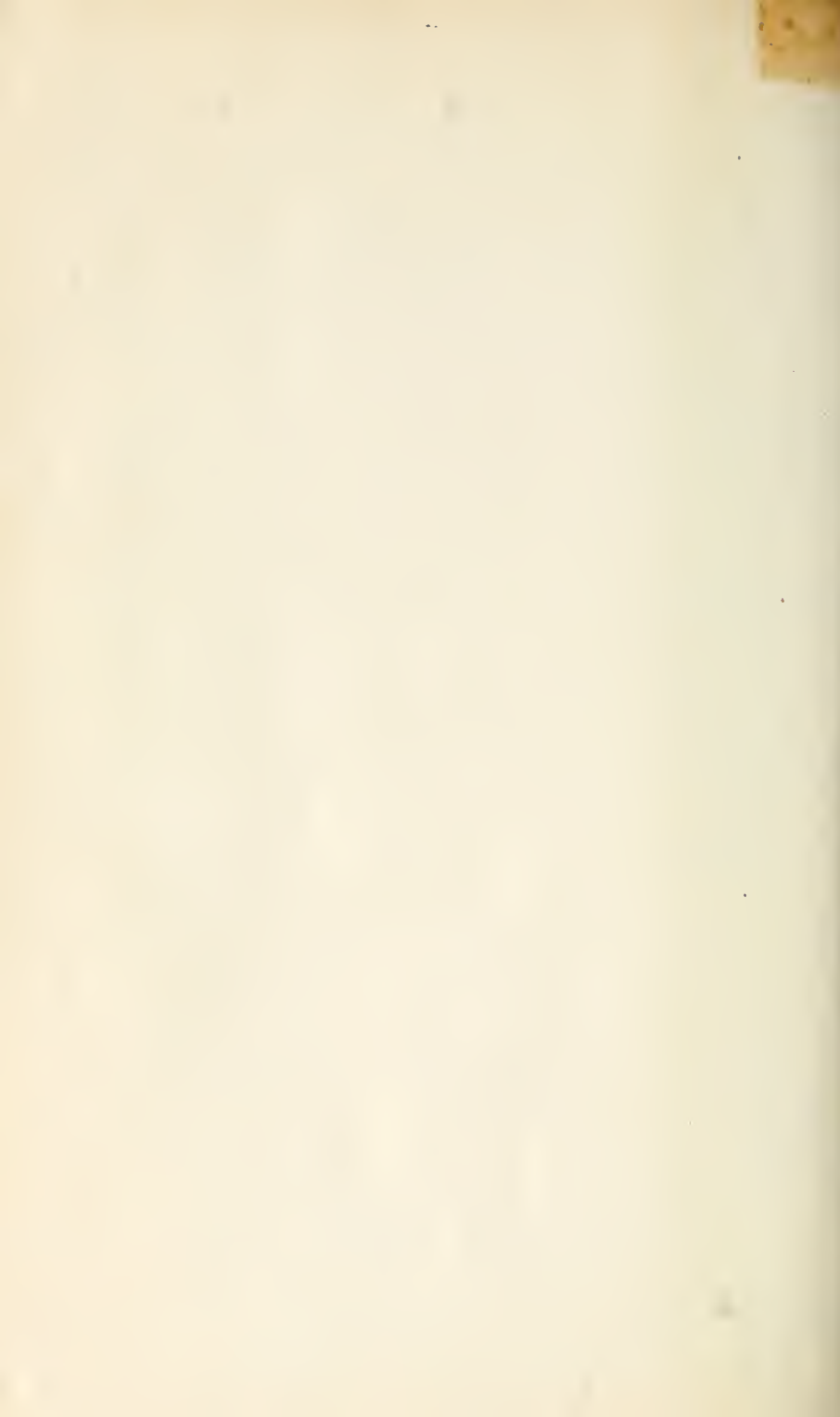
I perceive that there is nothing better than that a man should rejoice in his own works; for that is his portion.

That which befalleth the sons of men befalleth beasts; even one thing befalleth them: as the one dieth, so dieth the other; yea they have all one breath; so that a man hath no prominence above a beast all go unto one place; all are of the dust, and all turn to dust again. Who knoweth the spirit of man that goeth upward, and the spirit of the beast that goeth downward to the earth?

The living know that they shall die; but the dead know not anything, neither have they any more reward; for the memory of them is forgotten neither have they any more a portion forever in any thing that is done under the sun. Go thy way, eat thy bread with joy and drink thy wine with a merry heart; for God now accepteth thy works.

May we now consider the enmity between science and religion at end? If so—suppose we say Q.E.D. here—and let the matter R.I.P. Peace, brethren, peace!

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